The Origin of Money in Greece

Livio C. Stecchini

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Thesis
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Contents

Synopsis		1
Part I: Iron Currency		3
1	The Dedication of the Heraion	5
2	The Use of ὀβελίσκοι	11
3	Utensil Money	19
4	Cast Iron	23
5	Weighed Currency	33
6	Agio	39
7	The Meaning of φειδώνεια μέτρα	45
8	The Phrase μέτρα και σταθμά	51
9	Euboic Mina	53
10	Palamedes	59
11	The Dedication of Delphoi	71
12	The Balance of Perachora	79
Addendum I: Homeric Currency		87
1	Bronze-Age Copper Ingots	89
2	Utensil-Money of Double Axes	95
3	Weighed Double Axes	99
4	Currency of Cauldrons	101
Addendum II: Iron Currency of the Celts		105
Part II: Athenian Standards		111
1	The Meaning of νόμισμα	113
2	The Solonian Reform	123
3	The Hybrid System of Weights	133
4	Old and New Drachmae	139
5	Unification of Monetary Standards in the Athenian League	141

List of Abbreviations

AJA *American Journal of Archaeology*

BCH *Bulletin de correspondence hellénique*

DGE *Dialectorum graecarum exempla epigraphica potiora,* edited by Eduard Schwyzer (third ed., 1923)

DS *Dictionnaire des antiquités grecques et romaines*

EI *Enciclopedia italiana*

GDI *Sammlung der griechischen Dialekt-Inschriften,* edited by Hermann Collitz

IG *Inscriptiones graecae*

IG^2 *Inscriptiones graecae,* editio minor

JHS *Journal of Hellenic Studies*

MS *Metrologicorum scriptorum reliquiae,* edited by Friedrich Otto Hultsch

NC *Numismatic Chronicle*

RE *Paulys Realencyclopädie der classischen Altertumswissenchaft,* second edition

RV *Reallexikon der Vorgeschichte*

SIG^3 *Sylloge inscriptionum graecarum,* edited by Wilhelm Dittenberger (third ed., 1915)

Synopsis

The adoption of coined money stemmed from the mutual influence of two different types of media of exchange: weighed metals and utensil-money. While the countries under the influence of Assyrian and Egyptian culture were using as currency precious metals measured by weight on the basis of the mina and its multiples and sub-multiples, the Greeks of the Dark Ages were using utensil-money counted by units in which shape and not the intrinsic content of metal was relevant. Utensil-money tended to be made of the cheapest possible metal fit for an object of the desired appearance and shape. There are reasons to believe that the currency of double axes mentioned in the Homeric poems was of cast iron; the limited use of iron in the Homeric culture may be explained by the circumstance that cast iron, and not wrought iron, was then known. The Spartan iron money of historical times, too, was of cast iron; this may have been a survival of an earlier general use of cast iron for the manufacture of utensil-money.

In the seventh century B.C. weighed silver began to be used in Greece as a medium of exchange; this silver was measured on the basis of the mina and its sexagesimal submultiple, the shekel, according to the Babylonian-Assyrian method of reckoning. In the Peloponnese, weighed silver currency came into competition with the established

currency of iron obols. Obols were a form of utensil-money consisting of the spits used for broiling meat on the open fire: they were an object of daily use down to classical times, not only in Greece, but also in Italic, Etruscan, and Celtic territory. A relation of value was established between the iron obol and weighed silver: six iron obols, that is a drachma, were considered equal to a shekel of silver. This relation was called μέτρα, which means ratio and is synonymous with ἀριθμον. By the establishment of this relation, the concept of a continuum measured by weight was extended from the silver currency to iron, so that an iron obol came to be considered equal in value to a piece of iron in any shape, provided the weight was identical. This equivalence was dramatized by setting up at the Heraion of Argos, probably on the opposite sides of a balance, a bundle of 180 iron obols of traditional shape and a solid iron lingot having the same weight as the bundle. The 180 iron obols, and likewise the solid iron lingot, had a value of half a silver mina. The particular silver mina used as a unit was known as the Euboic mina and became the basis of all Greek monetary standards; the name Euboic is derived from Euboia, the name of the location of the Heraion, not from the island of Euboia. There resulted a bimetallic system of currency in which both iron and silver were measured by weight. The short thick iron bars found at the temple of Artemis Orthia in Sparta are an example of the new obol in which weight and not shape was the telling factor. However, bimetallism did not last long and silver remained the only currency in Greece, with the exception of Sparta and a few lesser cities where iron remained the only legal currency. The disappearance of one or the other currency from the market may be explained by Gresham's law: the same relation of value which made iron a "good" currency in the rest of Greece made silver a "good" currency in Sparta where iron was cheaper.

Close examination of the cuttings in a fragment of inscribed stone found at the temple of Hera Limenia at Perachora reveals that it was

a part of the base of a balance used to weigh iron currency. Pottery sherds found with the stone reveal that the balance ceased to be used around 600 B.C. and thus suggests that iron currency was not used beyond that time.

In the period in which both iron and silver were in circulation, it was found that silver, being less bulky, was preferable to a quantity of iron of the same value, that is, that silver was at "agio" over iron. The agio was taken into account by asking the party who traded it to add an extra amount, so that it took seventy iron drachmae, and not sixty, to make up the acceptable equivalent, and hence the real value of a silver mina. This modified relation was called *φειδώνεια μέτρα*, "short relation," because by it the party who exchanged iron for silver received less silver than it would have received if agio had not been considered. At a later time, when iron was no longer used as currency, the adjective *φειδονέιο* was understood as a reference to a ruler called Pheidon. The economic factor of agio explains why many weights of the ancient world existed in a heavy and in a light variety: the heavier variety was used to weigh commodities which were less desirable from the point of view of easy handling. In Athens, units used to weigh all commodities other than silver were heavier than those used to weigh silver, because silver had the advantage of being the accepted medium of exchange.

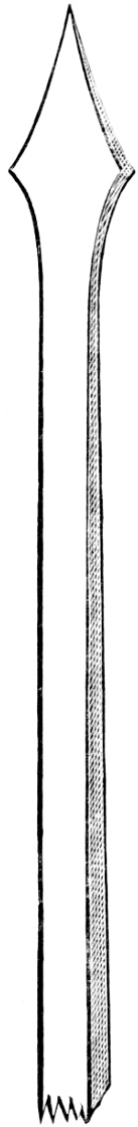
The original meaning of the word *νόμισμα* is not that of "coin," but that of "accepted standard" of value. The word was first used in the fifth century B.C. as a doublet of *νόμος*. For this reason, to clarify the concept of *νόμισμα* it is necessary to clarify that of *νόμος*. *Νόμος* is not to be taken as the counterpart of the Roman lex, but represents a peculiarly Greek conception of what is accepted without compulsion as the standard of right in a given community. The idea of a society based on a system of socially established standards is a key to the understanding of Greek thoughts in the field of jurisprudence, political theory, and economic doctrine.

Once the meaning of the words *νόμισμα* and *νόμος* is clear, the interpretation of the passage concerning the monetary reform of Solon is no longer open to dispute. All that Solon did was to abandon the *φειδώνεια μέτρα* based on the sexagesimal division of the mina, and to make the drachma equal to the half *kedet*, one hundredth of a mina, according to the Egyptian decimal system of reckoning. This reform had to do with political relations with Egypt, because on the eve of Solon's reform a bundle of obols, similar to that of the Argive Heraion, was set up in front of the temple at Delphi by Nitokris, divine consort (*ἑταιρα*) of Psammmetichos II of Egypt. The conclusions reached concerning the Solonian reform agree with the evidence afforded by coins and by reference weights found in Attica. They also contribute to the solution of the much-disputed problem of the Aeginetan mina. The Aeginetan mina is a hybrid creation of the Athenian market, achieved by taking the pre-Solonian drachma, equal to the Aeginetan drachma, which is a modified sexagesimal submultiple of the mina, and giving to it a centesimal multiple, according to Solon's centesimal division of the mina.

From the results reached concerning Greek technical terms in matters of coinage, it follows that the Athenian decree concerning the striking of coins by members of the Athenian League did not forbid the allied cities from issuing coins, as is currently believed, but merely ordered them to issue coins according to Athenian standards. This interpretation is in agreement with numismatic evidence and does away with the need of assuming that the decree was passed but not enforced.

Part One

Iron Currency



Natural-size drawing of the point of an ὀβελίσκος of the Argive Heraion (*Journal international d'archéologie numismatique,* IX (1906), pl. X).

1. The Dedication of the Heraion

In 1894, during the excavation of the Heraion of Argos, on the platform which extended in front of the main temple, there came to light two unusual objects: one, a bundle of 180 long (120 cm.) thin iron spits, and the other, a solid lingot equal in length to the spits and equal in weight to what seems to have been the original weight of the bundle. The iron spits are rectangular in section and have one end flattened out in the shape of a spear; the solid lingot is also rectangular and is flattened out at about one foot from the end.[1]

The excavator Waldston[2] recognized that the long thin spits of spear-like appearance are the ὀβελίσκοι mentioned by various literary sources as having been used as money.[3] He also noticed that the very fact that ὀβελίσκοι had been dedicated at the Heraion was mentioned in

1. Described by Charles Waldstein (Waldston), *The Argive Heraeum* (Boston, 1902), I, 61. 77; Ioannes N. Sboronos (Jean N. Svoronos), *Journal International d'Archéologie Numismatique,* IX (1905), 192; Charles T. Seltman, *Athens; Its History and Coinage before the Persian Invasion* (Cambridge, 1924), 117; Idem, *Greek Coins; A History of Metallic Currency and Coinage down to the Fall of the Hellenistic Kingdom* (London, 1933), 34.

2. *Op. cit.,* I. 62.

3. E.g., Plutarch, *Lysander* XVII; Pollux IX, 77.

a quotation from Herakleides of Pontos in Orion, s.v. ὀβολος:

> Ὀβολος. Ὀβολός. τροπῇ τοῦ ε εἰς ο. πρὸ τούτου γὰρ ὀβελίσκοις τραχέσιν ἐνομίστευον τὰ πρός σταθμόν. οἵ μὲν οὖν Ἴονες ὀβελός, ἡμεῖς δὲ ὀβολος. πρῶτος δὲ πάντων Φείδον Ἀργέιος νόμισμα ἔκοψεν ἐν Αἰγίνῃ καὶ διδοὺς τὸ νόμισμα καὶ ἀναλαβὼν τους ὀβελίσκους, ἀνέθηκε τῇ ἔν Ἀργέι Ἥρᾳ. ἐπειδή τότε ὁι ὀβελίσκοι τὴν χεῖρα ἐπλήρουν, τουτέστι τὴν δράκα, ἡμεῖς καίπερ μὴ πληροῦντες τὴν χεῖρα τοῖς ἓξ ὀβολοῖς δραχμὴν αὐτὴν λέγομεν, παρὰ τὸ δράξασθαι. ὅθεν ἔτι καὶ νῦν ὀβολοστάτην καλοῦμεν τὸν τοκιστὴν, ἐπειδὴ σταθμοις τους ὀβελίσκους παρεδίδουν οἱ ἀρχαῖοι. ὅυτος Ἡρακλείδες ὁ Ποντικός

The discovery of the very ὀβελίσκοι mentioned by Herakleides impressed Waldston as "a most striking archaeological confirmation of the statements of ancient historical writers."[4] This remark had unfortunate consequences, because numismatists followed him in this line of reasoning and concluded that everything Herakleides had said had been confirmed by the spade of the archaeologist. As a result, they based their doctrines of the origin of money on the quotation of Herakleides, without considering why and how he had reached his conclusions. Furthermore, by paying attention to the statements of Herakleides, they failed to consider carefully what information may be derived from the study of the iron objects themselves. They forgot that the significance of an archaeological discovery is conditioned by the exact nature of what is discovered.[5]

4. *Loc. cit.*

5. Evidence of the scant attention paid to the iron objects in themselves is afforded by Svoronos' and Seltman's careless statements about the place of their finding. Svoronos, *op. cit.,* 195, claims that the objects "were discovered by digging at great depth and amid objects which all antedate the discovery of coined money." Seltman, *Athens,* 117, affirms "that the obeloi were found at the north-east angle of the terrace on the site occupied by the early temple, which had preceded the building burnt down in 423 B.C., that is the temple contemporary with the famous Argive kings." But according to Waldston, *op. it.,* I, 77, the objects were found in the process of cleaning the platform in front of the temple built after 423 B.C.,

Herakleides' sentence *πρῶτος δὲ πάντων Φείδον Ἀργέιος νόμισμα ἔκοψεν ἐν Αἰγίνῃ καὶ διδοὺς τὸ νόμισμα καὶ ἀναλαβὼν τους ὀβελίσκους, ἀνέθηκε τῇ ἔν Ἀργέι Ἥρᾳ* was singled out and, on the basis of it, the proposition was regarded as definitely proved that Pheidon of Argos was the first to strike coins in Aigina, and that he dedicated the *ὀβελίσκοι* at the Heraion, in order to abolish iron currency and substitute in its place his new silver coins.[6] In reality, this contention of Herakleides must be accepted or rejected on its own merits, and cannot be considered as proved by the archaeological findings.

Scholars have been led astray by their surprise that the archaeological discovery was in agreement with the statement of an ancient writer, even though Herakleides mentions only the *ὀβελίσκοι* and not the solid ingot. But the coincidence is less startling than it has been believed: since the iron objects were found on the platform of a temple which was built after an older one was destroyed by fire in 423 B.C.,[7] they were to be seen there by any visitor at the time of Herakleides. Hence, finding them there is no more an unusual event than the unearthing of a building or a relic mentioned by Pausanias or Strabo. Naturally, scholars do not accept at face value all that these writers relate about the history of the buildings or temple relics they describe.

The passage of Orion which has been the basis of all papers on the origin of money published in this century, is a quotation from the work

among "deposits of rubbish which evidently dated from a period of destruction in later years, as we here also found a marble head of the Roman period."

6. Seltman, *Greek Coins,* 34; Joseph Grafton Milne, *Greek Coinage* (Oxford, 1931), 18; idem, *The First Steps in the Development of Greek Coinage* (Oxford, 1934), 12; Walther Giesecke, *Antikes Geldwesen* (Leipzig, 1938), 8. Only Percy Gardner, *A History of Ancient Coinage; 700–300 B.C.* (Oxford, 1918), 113, doubts the validity of this part of Herkakleides' statement: "But the assertion that Pheidon issued coins at Aegina is a statement which we cannot accept… it was the weights, not the coinage of Greece, which was due to Pheidon."

7. Thukydides IV, 133; cf. Pausanias II, XVII, 7.

περὶ ἐτυμολογιῶν of Herakleides of Pontos, the pupil of Plato.[8] This work was written according to the conception of ἐτυμολογία that Plato derived from the sophists and used in his dialogue *Cratylus*.[9] It is not grammatical research, but the study of words to expound some point of philosophical doctrine; words are attacked not from the grammatical point of view, as they were later in the Alexandrian schools, but are considered as semantic entities which express the idea embodied in the thing.[10]

Since money is called νόμισμα or νόμος in Greek, the problem of the nature of money played a great part in Greek philosophical thinking after Hippias of Ellis raised the issue of the distinction between social institutions which exist by nature, φύσις, and those which exist only by social convention, νόμος. The specific question touched upon by Herakleides in the passage quoted by Orion, was one on which there was disagreement between Plato and Aristotle. According to Plato, money has value only by social convention, νόμῳ (the nominalist theory of money), whereas according to Aristotle, money has a value by itself, φύσι, since it is first of all a commodity, χρεία (the realist theory of money).[11] Aristotle's position was in agreement with the practice of most of Greece in his own time, where the medium of exchange was silver coins valuated according to their content in silver. To prove their case, Plato's school cited the iron money of the Spartans, which they said was useless iron, and therefore had no value as a commodity.[12] This

8. Leopold Cohn, "De Heraclide Pontico etymologiarum scriptore antiquissimo," *Commentationes Philologae in Honorem Augusti Reifferscheidei* (Breslau, 1884), 84; cf. Henry Theodore Wade-Gery, *Perachora; The Sanctuaries of Hera Akraia and Limenia,* by Humphry Payne and others (Oxford, 1940), 261 n. 2.

9. Cohn, *op. cit.,* 91; cf. Richard Reitzenstein, "Etymologika," R.E., XI, 808.

10. Benvenuto Terracini, "Etimologia," E.I. XIV, 455.

11. For Plato money is simply a token (*De Rep.,* II, 371B: ξύβολον τῆς αλλαγῆς), whereas for Aristotle it must have an intrinsic value (*De Rep.* I 1257A: δ τῶν χρησίμον αὐτὸ ὄν).

12. Plato, *De Leg.* 742 a, recommends the use of such a type of currency within the city, limiting the use of gold and silver to foreign trade.

is the reason for Herakleides' interest in the ὀβελίσκοι; in the original text he must have mentioned the ὀβελίσκοι of the Heraion to prove that, before silver coins were introduced, not only the Spartans, but all the Greeks used ὀβελίσκοι as money.

A passage of Pollux' chapter on measures and money, derived from good authors,[13] reflects the dispute between Plato's school and Aristotle (IX 6, 77):

> το μέντοι τῶν ὀβολῶν ὄνομα ὁί μὲν ὁτι πάλαι βουπόροις ὀβελοῖς ἐχρῶντο πρὸς τὰς ἀμοιβὰς, ὧν τὸ ὑπὸ τῇ δρακὶ πλῆθος ἐδόκει καλεῖσθαι δραχμὴ, τα δ' ὀνόματα καὶ τοῦ νομίσματος μεταπεσόντος εἰς τὴν νῦν χρείαν ἐνέμεινεν ἐκ τῆς μνήμης τῆς παλαιᾶς. Ἀριστοτέλης δὲ ταυτὸν λέγων ἐν Σικυωνίων πολιτείᾳ. σμικρόν τι καινοτομεῖ, ὀφελοὺς αὐτοὺς δηλοῦντος το αὔξειν, αὐτων δὲ διὰ τὸ εἰς μῆκος ηὐξῆσθαι ὧδε κληθέντων. ὅθεν καὶ τὸ ὀφείλειν ὠνομάσθαι φησὶν οὔκ οἰδ'ὅπως. ἐπῖ μέντοι τῶν ὀβελῶν ὑπηλλάχθαι τὸ φ εἰς τὸ β κατὰ συγγένειαν.

From this passage it appears that Plato's school argued that, although in their own day money consisted of silver which is a commodity, it was derived from something which was not a commodity (μεταπεσόντος εἰς τὴν νῦν χρείαν), as is proved by the fact that silver money is counted by drachmae and obols. The drachma was originally the name for the handful of ὀβελίσκοι from which comes the name obol, for the sixth part of the silver drachma. To this Aristotle replied that the obol has nothing to do with ὀβελίσκοι, but it is so called because it is a fractional unit of the drachma, and a number of obols put together (ὀφείλειν) make the basic quantity (μῆκος).

Pollux' source chides Aristotle for his newfangled etymology and in so doing he is right, because the Platonic explanation of the origin of the terms drachma and obol is correct. Nevertheless, one should not jump to the conclusion that everything that Plato's school defended on this subject is correct, because the reading of Herakleides' own ἐτυμολογίαι,

13. Friedrich Otto Hultsch, M.S., I, 151.

or those of his master Plato, shows how little respect they had for the facts when it was a question of proving a point of doctrine by this method. The sophist tradition of etymology has little to do with the painstaking striving for grammatical and historical precision evident in the etymological researches of Didymos and other Hellenistic scholars. The farcical etymology defended by Aristotle, who in general is a good collector of material evidence, reveals what was meant by etymology in his day.

In my opinion, Herakleides' explanation is entirely correct as far as the pure etymology of δραχμή and ὀβολός is concerned, but less accurate in the historical details he adds to it; however, my conclusion on the subject must depend on the analysis of all available sources of information.

2. The Use of ὀβελίσκοι

Numismatists have failed to consider that the long thin rectangular spits found at the Heraion were an object of daily use in Greece, both in preclassical and in classical times.

They were called ὀβελίσκοι, βουπόροι ὀβελοί, or βουπόροι ὀβελίσκοι. The ὀβελός is a pointed tool, a spike, as indicated also by its etymology: the word ὀβελός with its parallel forms ὀβολός and ὀδελός, is derived from βάλλω and its parallel form -δελλω, the basic meaning of which is "to prick."[1] It is connected with βελόνη, "needle," βέλος, "missile, pointed weapon," ὀξυβελής, "sharp-pointed," δέλλις, "wasp." The ὀβελός in question is a particular type which is known as ὀβελίσκος or βουπόρος ὀβελός; it is called simply ὀβελός in contexts which make its precise nature evident. Although grammatically ὀβελίσκος is a diminutive of ὀβελός, the suffix is used in this case not to express smallness, but to form a derivative more pregnant in meaning, as often happens with diminutive endings. Pierre Chantraine[2] has pointed out that the suffix –ίσκος is commonly used in technological language to create a specific term for an instrument of a definite shape and purpose. In the case of ὀβελίσκος, the suffix gives to the noun ὀβελός that precise sense which is otherwise given by the

1. Émile Boissace, *Dictionnaire étymologique de la langue grecque étudiée dans ses rapports avec les autres langues indo-européenes* (Heidelberg, 1938), s.v. βάλλω, δέλλιθης, ὀβελός.

2. *La Formation des noms en grec ancien* (Paris, 1933), 407.

adjective βουπόρος. This adjective is compounded from the verb πείρω which means "to transfix with a broach":

Odyssey X. 124
ἰχθῦς δ' ὡς πείροντες
"spearing them like fishes"

Iliad XXI. 577
περὶ δουρὶ πεπαρμένη
"pierced with a spear"

In its more frequent use it means "to stick meat on a spit for cooking."

Odyssey III. 33
κρέα τ' ὤπτων ἄλλα τ' ἔπειρον

Pausanias IV XVII 1
ὀβελοίς ὃις τὰ κρέα ἔπειρον ὀπτῶσαι

The passages just quoted disprove the notion that the "beef-piercing spikes" were goads (*Rindertreibspieße*), as maintained by Kurt Regling[3]; but the prevalent conflicting opinion that they were used for spitting and roasting a whole animal or big parts of it, is not correct either.[4] It is true that the ὀβελίσκοι were used to cook meat on the fire, but by a method different from any of modern times. They were not used for roasting – in the sense of slowly revolving around the fire – a whole animal or big parts of it. The animal, which could be a pig,[5] a goat,[6] a

3. "Geld," *R.V.,* IV 219. According to Svoronos, *op. cit.,* 197, 202, ancient sources describe the ὀβελίσκοι not only as roasting spits, but also as ox-goads and darts.

4. This point has been seen by Bernhard Laum, *Heiliges Geld; Eine historische Untersuchung über den sakrale Ursprung des Geldes* (Tübingen, 1924), 107, in a book otherwise full of questionable statements.

5. Odyssey XIV, 73.

6. Iliad IX, 207.

sheep,[7] as well as an ox,[8] was cut into small pieces according to definite rules, and each part was handled in a different manner according to its nature. From Homer one gathers that there were two ways of cooking the meat: one, called καίειν, which is broiling by exposing directly to the flame; and the other, which Homer called ὀπτᾶν[9] and later writers ἐπανθρακίξειν,[10] which corresponds to our roasting. When the fire is burning lively, various selected parts of the animal, among which are the thighs (μῆρη) and the viscera (σπλάγχνα), are spitted on the tip of the ὀβελίσκοι and scorched by the flame;[11] after the fire has died down and the embers have been scattered,[12] the rest of the meat, divided into slices, is tied with strings around the ὀβελίσκος and roasted by the heat of the embers (plate I). In this second operation only, not in the first, the ὀβελίσκοι rested on supports (κρατευταί); whereas during the first operation, which seems to have been the more important one, the ὀβελίσκοι were held in the hand while the meat was seared by the blaze. The idiom τὸ θερμὸν τοῦ ὄβελου αἱρεῖσθαι[13] "to tackle a problem by the wrong end," implies that this operation was so rapid that only one end of the metal spits had time to get hot. Even though the pieces broiled this way were very small, they were generally spitted on more than one ὀβελίσκος. Most of the parts are held by a number of spits varying from two to about half a dozen; it is difficult to determine the maximum number in the ceramic representations (plate II). The reason for using more than one spit is that the ὀβελίσκοι serve also as skewers, to keep

7. Iliad XXIV, 621.

8. Iliad VII, 314.

9. Iliad I, 459-466; IX, 206-217.

10. Kratinos fr. 143 Kock; Aristophanes *Ranae* 670; Hesychios s.v. χναύματα; Pollux II, 55.

11. Iliad I, 464, II, 423.

12. Iliad X, 212.

13. Suidas, s.v. ὀβολός.

the various cuts of meat in a definite position with the alternation of fat and lean.[14] Vase paintings show that there is one specific portion, twisted around the tip of the spit as if it were a rag, which is always held by a single ὀβελίσκος (Plates II, III); this is probably the part which was dedicated to the gods and charred completely.

Because several spits were needed for cooking a single animal, the ὀβελίσκοι were kept in sets. This has been pointed out by Joseph Déchelette[15] on the basis of iron and bronze specimens found in a territory extending from Central Italy to the German Palatinate and southern Spain. The number of spits in a set varies, to our knowledge from five to eight. Most of the sets come from Etruscan territory or from Italic and Celtic territory under direct Etruscan influence; but this is not sufficient to prove, as Déchelette assumes, that all sets found throughout Western Europe are imitations of Etruscan models.[16] The sets studied by Déchelette, to which there must be added an Etruscan set in the Metropolitan Museum,[17] may be divided into three types,

14. Iliad I, 461; Odyssey XIV, 427.

15. "Broches en fer d'époque gauloise servant de monnaie primitive; Études sur l'origine de la drachme et de l'obole," *La Collection Millon; Antiquités préhistoriques et gallo-romaines* (Paris, 1913), 191-243.

16. These objects were identified with the Greek ὀβελίσκοι by Edoardo Brizio, "Il sepolcreto gallico di Montefortino presso Arcevia," *Monumenti Antichi,* IX (1901), 776.

17. Gisela M. A. Richter, *The Metropolitan Museum of Art; Greek, Etruscan and Roman Bronzes* (New York, 1915), nos. 677-681. All five pieces of this set have almost the same length, 104 cm. Miss Richter has provided me with the following information about their weight:

no.	677	425 grams
	678	446
	679	513
	680	455
	681	446

according to the shape of the butt;[18] all three of these types are also represented on Greek vases. All specimens of these three types, whether they are of bronze or of iron, have approximately the same length and weight as those of the Heraion. They differ, however, from those of the Heraion in that, instead of having a point like that of a spear, their point is tapered like that of a pencil. The butt may be plain, as in some Greek vases (Plate III), and in a set found in the bed of the Saône River; in this set the pieces are kept together by being inserted into a tube–like handle (Plate V). The butt may be thickened and pierced by a hole, through which goes the peg of a clevis, as in all pieces from Italy (Plates VI, VII) and in one represented on a Greek vase (Plate VIII). Finally, there is a type in which the butt looks like the handle of a sword; this type has been found in southern Spain,[19] and is depicted on many Greek vases (Plates II, IV) and on the Etruscan Situla della Certosa (Plate IX).

No set of ὀβελίσκοι identical with those of the Heraion has yet come to light; but such a set is clearly drawn on a vase painted by the artist known as the Pan–painter (Plate X). In this set the pieces are kept together by sliding metal rings, which are also used in the sets found in the Gallic cemetery at Montefortino (Plate VI). Since the Pan-painter, who lived in the first half of the fifth century B.C.,[20] has also depicted spits of the sword-handle type (Plate II), one cannot presume, in the present state of the evidence, that there were preferences for one type or the other according to historical period or geographical region.

Déchelette[21] believes that a set of ὀβελίσκοι, united by one of the above-mentioned devices, are called δραχμή; but he is not correct on

18. Wade-Gery, *op. cit.,* 259, deals briefly with the problem of the various types of ὀβελίσκοι. His conclusions are unsatisfactory.

19. Déchelette, *op. cit.,* fig. 47.

20. John Davidson Beazley, *Der Pan-Maler,* Bilder griechischen Vasen 4 (Berlin, 1931), 17.

21. *Op. cit.,* 212.

this point, because such sets were used in classical times and there is no evidence that they were called δραχμαί. If they had been so called Herakleides of Pontos, in explaining why six obols are called a drachma, would have made some reference to the fact. In order to prove that in Greece in classical times the ὀβελίσκοι came in sets of six, Déchelette quotes a comedy of Anaxippos,[22] where a cook is asked to make ready for a banquet, among other utensils, ὀβελίσκους δώδεκα; but the same passage could be used to prove that the ὀβελίσκοι were available in any desired number. Even a single ὀβελίσκος could be in use, as is proved by the tale that Epameinondes died so poor that only an ὀβελίσκος σιδηροῦς was found in his home.[23] Incidentally, this anecdote cannot be construed, as Seltman suggests,[24] to prove that iron money was in use in Boiotia at the time. As for the use of a single ὀβελίσκος, it is possible that, in the houses of less fortunate families in classical times, it was used mainly for baking bread, since ὀβελίσκοι were also used to prepare bread by toasting the dough. The bread so prepared was called ὀβελίας, and loaves of it, left on the spits, were carried in sacred processions by ὀβελιαφόροι.[25] Such a method of baking bread was very rapid and did not require an oven; for these reasons it was used by soldiers in the field.[26] However, when ὀβελίσκοι were used for preparing meat, a set of about half a dozen was needed. Since at Montefortino there have been found sets of six, seven, and eight pieces, it must be concluded that there was no custom fixing the precise number of ὀβελίσκοι in a set.

Déchelette[27] has pointed out that the word πεμπώβολον, used by

22. fr. 6 Kock.

23. Plutarch, *Fabius Max.,* XXVII.

24. *Athens*, 121, n. 3.

25. Athenaios III 111 b; Pollux I 248; Hesychios s.v. ἄκροβολίδες.

26. Athenaios III 111 b.

27. *Op. cit.,* 213. For the traditional point of view, see Wolfgang Helbig, *Das Homerische Epos aus den denkmälern erlautert* (Leipzig, 1887), 353.

Homer in two identical lines,[28] does not mean, as it was believed, a five-pronged fork, but a set of five ὀβελίσκοι. It is likely that all sets were called by similar compounds, according to the number of their pieces.[29] In my opinion, the term δραχμή, "handful," was applied to the ὀβελίσκοι only when they were used as a medium of exchange.[30] It does not designate any specific object, but a unit of account.[31] Only after silver money was introduced, the equivalent in iron of a silver shekel was referred to as drachma for the sake of convenience. If the term drachma were not a later development, it would be difficult to explain why half a drachma is much more often called τριώβολον than ἡμίδραχμον, and why, in an inscription of Oropos, a drachma and a half is called ἐννεόβολον δοκίμου ἀργυρίου.[32]

28. *Il.* I 463; *Od.* III 460.

29. Eustathios *ad Il.* I. 463: τρισὶν ἔπειρον ὀβελοῖς οἵ λέγοιντο ἂν τριώβολα

30. Cf. Georg Thilenius, "Primitive Geld," *Archiv für Anthropologie,* XVIII (1921), 28.

31. Cf. Herodotos III, 13: πεντακοσίας μνέας ἀργυρίου ... ταύτας δρασσόμενος αὐτοχειρίῃ διέσπειρε τῇ στρατιῇ

32. *I.G.* VII 235, 22.

3. Utensil Money

The ὀβελίσκοι are an example of utensil-money such as is found among many primitive peoples.[1] Utensil-money is convenient for a primitive society, because it does not require either scales or reference to a standard of weight; it is not measured, but counted by talo, that is, by units, and the units in turn are not measured, but have to conform to a certain shape, which is determined by practical utility combined with custom.

As utensil-money, the ὀβελίσκοι had the particular advantage of being very simple in shape and very long and thin, so that once the length was kept constant, as could be easily achieved, the width could be judged by the eye without material difference in the result. The ὀβελίσκοι of the Heraion are *ca.* 120 cm. long, and this suggests that they had been calculated at four feet.[2]

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1. Heinrich Schurtz, *Grundriß einer Entstehungsgeschichte des Geldes,* Beiträge zur Volks- und Völkerkunde 5 (Weimar, 1898), 141; Regling, *op. cit.,* IV, 216; George Montandon, "La Moneta presso i primitivi," *E.I.*, XXIII, 635.

2. By this I mean four feet as a natural measure, whereas Seltman, *Athens,* 121, maintains that the ὀβελίσκοι were four Attic feet long. He assumes that, before Pheidon introduced new measures of length (μέτρα), the Peloponnesians used an "Attic foot" of 29.57 cm. In reality, all evidence concerning the use of this foot,

Utensil-money is such that even the precise nature of the component metal might have been of lesser relevance. From the monetary point of view, it could have been immaterial whether the ὀβελίσκοι were of bronze or of iron, although by the operation of Gresham's law, the bronze ones, being the better ones, would be driven out of circulation as currency. The ὀβελίσκοι found in western Europe are either of bronze or of iron, but Greek literary sources, beginning with Homer, describe them as being of iron.[3] Possibly the bronze pieces were luxury products and were not in common use even as cooking utensils. The number of iron and bronze specimens in modern collections is no indication of their original frequency of occurrence, because iron objects are easily destroyed by rust and, even when preserved, are slighted by free-lance diggers, antique dealers, and collectors. In Homer, the double axes (πελέκεις) used as tools are of bronze, but those used as currency are of iron. Hence, it seems safe to conclude that the ὀβελίσκοι used as currency were normally of iron, but if bronze ones had been offered as payment,

which is equal to the Roman one, is relatively late. Measurements of buildings point to the use of feet of varying length in the various parts of Greece (Luigi Jacono, "Pieds," *E.I.*, XXVII, 167); I understand that William Bell Dinsmoor has calculated that a foot of 32.6 or 32.7 cm. was used in the construction of Athenian buildings. Perhaps, for a long time, the Greeks were satisfied with natural methods of measurement; cf. Eugene S. McCartney, "Popular Methods of Measuring," *Classical Journal,* XXII (1926-27), 325. The entire field is in need of a thorough investigation, which may possible take its start from the inscription *IG*^{2} I 373. For current views on the subject, see Angelo Segrè, *Metrologia e circolazione monetaria degli antichi* (Bologna, 1928), 138; Carl Friedrich Lehmann-Haupt, "Stadion," *R.E.* A. VI, 1933.

3. Ὀβελίσκοι of bronze are mentioned only in two passages of obscure import: Plutarch *Lysander* XVII: κινδυνεύει δὲ καὶ τὸ πάμπαν ἀρχαῖον οὕτως ἔχειν, ὀβελίσκοις χρωμένων νομίσμασιι σιδηροῖς, ἐνίων δὲ χαλκοῖς. *Etymologicum Magnum*, s.v. ὀβελίσκος: ὅτι ὁβολὸς ἐκλήθη, ἐπειδὴ τὸ αρχαῖον τὸ χαλκοῦν νόμισμα τῶν Ἀθηναίων ὀβελίσκους ἔιχεν. Φότιος πατριάρχης. It would seem that in some sections of Greece, among them Athens, ὀβελίσκοι were used as currency.

they would have been accepted as proper tender. Although Homer refers to the *ὀβελίσκοι* as objects of daily use, he does not mention them as units of value; he names instead an iron currency of double axes. There is evidence to the effect that double axes were used as currency in Tenedos up to the time silver coins were adopted, and that they were used as currency in Crete and Paphos at some time.[4] This proves that there were different local customs (*νόμοι*) as to what was to be accepted as a medium of exchange. It is unsound to assume, as Déchelette does,[5] that the *ὀβελίσκοι* were used as currency wherever they were used as cooking utensils.

A famous passage of Aristotle contains a reference to utensil-money which has escaped the attention of commentators:

De rep., I. 1257 a

> *διὸ πρὸς τὰς ἀλλαγὰς τοιοῦτόν τι συνέθεντο πρὸς σφᾶς αὐτοὺς διδόναι καὶ λαμβάνειν, ὃ τῶν χρησίμων αὐτὸ ὂν εἶχε τὴν χρείαν εὐμεταχείριστον πρὸς τὸ ζῆν, οἷον σίδηρος καὶ ἄργυρος κἂν εἴ τι τοιοῦτον ἕτερον, τὸ μὲν πρῶτον ἁπλῶς ὁρισθὲν μεγέθει καὶ σταθμῷ, τὸ δὲ τελευταῖον καὶ χαρακτῆρα ἐπιβαλλόντων, ἵνα ἀπολύσῃ τῆς μετρήσεως αὐτούς: ὁ γὰρ χαρακτὴρ ἐτέθη τοῦ ποσοῦ σημεῖον.*

The parallelism of *σίδηρος καὶ ἄργυρος* with *μεγέθει καὶ σταθμῷ* is not accidental: the measure by size (*μεγέθος*) is typical of iron money, whereas silver money is measured by weight (*σταθμός*). To be precise, Aristotle should have said shape (*σχήμα*) and not size (*μεγέθος*), since the former conveys the idea of being approximately of a certain contour, whereas the latter conveys the idea of the exact quantity contained within that contour. But utensil money is a disturbing fact to Aristotle, who maintains that money must have a value as a commodity (*χρεία*), and he circumvents the difficulty by construing the case of money defined by shape as a case of money measured by size. Utensil-money is counted, not measured; but Aristotle could not grant this point because counted money is credit

4. See Addendum I, Section 3.

5. *Op. cit.*, 205.

money, whereas it is the measured money which is commodity money.

The same difficulty confronted Aristotle in considering the Homeric gold τάλαντον, utensil money which consists of the pan of the scales symbolizing the weighing of souls.

Scholium ad Iliadem II. 169

> λύων ὁ Ἀριστοτέλης τὸ τάλαντον οὔτε ἴσον φησὶ τότε καὶ νῦν εἶναι, οὔτε ἀφωρισμένῳ χρῆσθαι σταθμῷ, ἀλλὰ μέτρον τι μόνον εἶναι, ὡς καὶ φιάλη σχῆμά τι ἀφωρισμένον ἔχον σταθμὸν, μέτρον δὲ οὐκέτι. καὶ τὸ τάλαντον δὲ μέτρον τί ἐστι, ποσὸν δὲ οὐκέτι ἀφωρισμένον

He granted that the τάλαντον was defined by shape (*σχήμα*) and that it did not have a definite weight, but still tried to conceive of it as something measured (*μέτρον τι*). In reality, it has a definite shape (*σχήμα τι ἀφωρισμένον*) only within the limits of the function it has to perform as a utensil. Aristotle himself recognizes that the τάλαντον is utensil-money when he compares it with the gold φιάλη, a sort of saucer, which sometimes is used as a unit of value in the Homeric poems.[6]

6. Il. XXIII 242, 616.

4. Cast Iron

Because some ancient philosophers were interested in proving that the iron money of the Spartans had no value as a commodity, they preserved for us a piece of information which not only makes clear the economic nature of this money, but also is of vital importance to the science of archaeology: the iron money of the Spartans was of cast iron.

Plutarch, drawing from older sources, relates that the iron money of the Spartans, as it was coming out of the fire, was dipped in vinegar, so that it would become unfit for forging, brittle, and incapable of taking a good edge:

Lysander XVII

τοῦτο δὲ ἦν σιδηροῦν, πρῶτον μὲν ὄξει καταβαπτόμενον ἐκ πυρός, ὅπως μὴ καταχαλκεύοιτο, ἀλλὰ διὰ τὴν βαφὴν ἄστομον καὶ ἀδρανὲς γίνοιτο

This statement[1] rules out the possibility that the metal in question is wrought iron or steel, both of which would be fit for forging and capable of taking a good edge. There is no doubt that the process described is the "chilling" of cast iron to make it hard.[2] Cast iron can be produced by the

1. Cf. Plutarch, *Lycurgos* IX.

2. On chilling cast iron see "Iron and Steel," *Encyclopædia Britannica,* 11th ed., XIV, 808.

easiest possible method of obtaining iron from the ore, that of placing alternate layers of broken ore and burning charcoal in a ventilated shaft. This method has the advantage of extreme simplicity, since iron flows to the bottom in a molten state, but it presents the disadvantage that, while flowing through the fuel, the iron absorbs carbon and thereby becomes cast iron. Cast iron cannot be forged and has poor mechanical qualities, such as brittleness and softness; however, since is soft, it lends itself to shaping by piercing and filing. If hot cast iron is quenched in a liquid (chilling), it becomes very hard, even though more brittle. It is to this process of chilling that the iron money of the Spartans was subjected; the same process is used today to make cast iron as hard as possible, with the only difference that brine is used instead of vinegar.[3]

Ancient writers who judged the Spartan money in the light of an abstract idealization, thought that it was chilled with the aim of making it unfit for any purpose but that of being a medium of exchange. On the contrary, the chilling of the ὀβελίσκοι satisfied originally the purpose of making them fit to be used as piercing instruments.

The fact that the currency of ὀβελίσκοι was of cast iron makes clear its economic nature. Since an object of chilled cast iron can be used as such, whereas its component metal is of little value as a commodity, it follows that, even though in historical time the Spartan iron money was measured by weight, it was a development from utensil-money which was not weighed. In the dialogue *Eryxias,* although it is stated that the Spartan money is weighed, it is compared with the currency of shaped

3. In the fifteenth century A.D., Vannoccio Biringuccio, *Pirotechnia,* translated from the Italian with and Introduction and Notes by Cyril Stanley Smith and Martha Teach Gnudi (New York, 1942), 372, recommends quenching in vinegar or urine for files, that is, for tools which have to be very hard. Today brine is used when there is a need for a quenching medium more rapid than plain water; cf. Howard Scott, "Quenching Media," *Metals Handbook 1939*; American Society for Metals (Cleveland, 1939), 328.

stones used by the Ethiopians, just because it is made of iron which is useless as a commodity.

Eryxias 400 b

ἐν δὲ Λακεδαίμονι σιδηρῷ σταθμῷ νομίζουσι, καὶ ταῦτα μέν[τοι] τῷ ἀχρείῳ τοῦ σιδήρου ... ἐν δὲ τῇ Αἰθιοπίᾳ λίθοις ἐγγεγλυμμένοις χρῶνται, οἷς οὐδὲν ἂν ἔχοι χρήσασθαι Λακωνικός ἀνήρ.

This point is made even more clear by the information that the Spartan ὀβολός had an intrinsic value (δύναμις) of four χαλκοῖ.[4] Angelo Segrè[5] considers this a contradiction in terms, whereas it means that the metal contained in a piece having the face value of an obol was evaluated at four χαλκοῖ. As for the value of the χαλκοῦς, Marcus Niebuhr Tod,[6] who has carefully studied the epigraphical evidence, concludes that in Athens and in some other communities it had the value of ⅛ of an obol, whereas in other parts of Greece it was worth 1/12 of an obol. However, this does not mean, as he believes, that the χαλκοῦς had a different value in various parts of Greece; the χαλκοῦς is a pan-Hellenic unit – possibly a development from some sort of utensil-money[7] such as a nail – which

4. Hesychios, s.v. πέλανορ: πέλανορ τὸ τετάχαλκον Λάκονες. Plutarch, Apophat. Laced. 226 d: *μόνον δ'ἔστι μνᾶ ὁλκῇ [Αἰγιναία], δύναμει δὲ χαλκοὶ τέσσαρες*. The word Αἰγιναία fits badly into the text; it must be a gloss written by someone who took ὁλκῇ for a diminutive, and identified the μνᾶ ὁλκῇ with the μνᾶ Αἰγιναία, which I shall discuss in Part Two, Section 4.

5. *Op. cit.,* 202.

6. "The Greek Akrophonic Numerals," *BSA*, XXVII (1936-37), 239.

7. In classical times the χαλκοῦς was a silver unit (Hesychios, s.v. χαλκοῦς:τοῦτο επὶ χρυσοῦ καὶ τοῦ αργύρου ἔλεγον) but it must have developed from a form of utensil-money which could be either of bronze or of iron. This is indicated by the fact that the silver unit was called either χαλκοῦς or σιδηροῦς: Pollux IX. 78: ὥστε αντὶ τοῦ πρίω μοι τρίῶν χαλκῶν λέγειν πρίω μοι τρίων σιδαρέων; Hesychios s.v. σιδάριος: σιδάριος, χαλκοῦς Suidas s.v. χαλκῷ: χαλκῷ, σιδήρῳ. This explains why in some inscriptions the value of a χαλκοῦς is indicated by the abbreviation Σ, a fact for which Tod, *op. cit.*, 240, could not find any explanation.

is worth ½ of an obol where the mina is divided into 70 drachmae, and ⅛ ; of an obol where the mina is divided into 100 drachmae. In the first group of localities, it takes 5040 χαλκοῖ to make a mina, and in the second group, 4800; the difference is practically immaterial, since the χαλκοῦς is used only as a fractional currency.

Plutarch[8] states that the Spartan iron obol weighs a mina, which is in agreement with the weight of *ca.* 405 grams, that is almost a silver mina, of the ὀβελίσκοι of the Heraion. Hence, the relation between silver and cast iron was about 1:1300 in Sparta in historical times. This datum confirms that the metal was cast iron, because the relation between silver and wrought iron is 1:250 in a Delian inscription of the third century B.C.[9]

In classical times, the Spartan money was the only instance of the use of cast iron, and this was the reason why the Spartan obol was called πελανός. The word πελανός indicates a thick viscous liquid, such as honey, or the same liquid after thickening, such as clotted blood; therefore, it is fittingly used to distinguish cast iron from wrought iron. It is believed that the money of the Spartans was known as πελανός because it had the shape of a disk, like a round cake.[10] This interpretation, on which there is universal agreement,[11]

8. See above, n. 55.

9. *I.G.* XI 158, 81. This relation seems to have remained constant through the Hellenistic age, because the relation is ca. 1:200 in Roman Egypt, according to the papyri studied by Angelo Segrè, *Circolazione monetaria e prezzi nel mondo antico ed in particolare in Egitto* (Roma, 1922), 158. Seltman, *Athens,* 119, has pointed out that the objects of the Heraion embody a relation of 1:400; but we do not know whether these objects were of cast iron or not. This uncertainty can be dissipated only by a metallographic examination of the objects, which are now in Athens.

10. This idea occurred to German scholars who identified the πελανός with their own custard pie called *Fladen* (French *flan*, English *flawn*) which gets its name from the fact that it is *flat*. The word πελανός is probably derived from the root of πλέω (Latin *pluit*; English *flow*); it may be connected with πλάδος, "watery, flaccid," (cf. Boissacq, *op. cit.*, s.v. πελανός, πλάδος).

11. Friedrich Otto Hultsch, *Griechische und römische Metrologie,* vol. 2 (Berlin,

rests on a poor reading of the Greek sources. Suidas[12] explains that the word πελανός means a kind of mushy pastry, the froth around the mouth, the gum of a tree, and also the ὀβολός paid for the consultation of an oracle: καὶ ὁ τῷ μάντει διδόμενος μισθος ὀβολός. A scholium to Nikandros, Alexipharm, 488, remarks that the word is used not only for a sort of pastry, but also for an ὀβολός: πελάνου βάρος ἀντὶ τοῦ ὀβολοῦ ὁλκὴν. οὐ γὰρ μόνον τὸ πέμμα, ἤγουν τὸ ἔφημα, πέλανος λέγεται, ἀλλὰ καὶ ἡ τοῦ ὀβολοῦ ὁλκή. Notice that the pastry is described as ἔφημα, and ἔψησις is the smelting of ore.[13]

At one time, the cast iron obol was used not only in Sparta, but throughout Greece. This appears from a number of inscriptions from Greek temples[14] in which the fee paid for consulting the oracle is called πελανός. The editors[15] of these inscriptions have thought that this offering was so called because originally it consisted of the pastry called πελανός. If it were so, the temples would have been very poor and not at all money conscious, in sharp contrast with all evidence.[16] In my opinion, the fee was originally paid with an iron obol and, for reasons of a ritualistic conservatism, it continued to be so paid even after silver became the accepted currency in the region of the temples. This interpretation fits with Suidas' statement that the obol paid to the prophet was called πελανός. In a further stage of development, the charge for consultation too was paid in silver and

1882), 535; Svoronos, *op. cit.*, 191; Segrè, *Metrologia,* 201.

12. s.v. πελανός.

13. The smelting of silver is called ἔψησις by Theophrastos *Hist. plant.* V 9, 1.

14. Apollo of Delphoi, *DGE* 322, 2; Apollo Pythaios of Argos, *DGE* 89, 12; Apollo Delios of Amorgos, *IG* XII, VII 237, 21 and 241, 11. Cf. Euripides, *Ion* 226.

15. Wilhelm Vollgraff, *BCH* XXVII (1903), 276 and XXXIII (1909), 173; Théodore Homolle, *Mélanges Nicolle* (Genève, 1905), 631; Jules Delamarre, *Revue Archéologique,* XXIX (1896), 75; cf. P. Stengel, *Berliner philologische Wochenschrift,* XXIV (1904), 1504).

16. The wealth of Delphoi was proverbial even in the Homeric age: *Iliad* IX 404.

its amount was raised to more than one obol,[17] but it continued to be called πελανός.

The iron money of the Spartans is a survival from an age in which only cast iron was available and the poor mechanical qualities of this metal were improved by chilling. The ὀβελίσκοι continued to be manufactured of cast iron in Sparta in historical times not only because of Laconian traditionalism but also because, since they did not need to stand any particular stress or shock, they could be satisfactorily made of this cheaper metal. Cast iron is the ideal metal for the rapid mass production of objects of identical pattern; for instance, when the production of cast iron was revived in the fourteenth century A.D., its main use was the production of cannon balls.[18]

Up to now, it has been a dogma among archaeologists[19] that the ancient world knew only the reduction of the ore by which wrought iron is produced. The only doubt raised concerns the knowledge of cast iron in Hellenistic times; this doubt is based on a passage of Pliny:[20]

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17. According to the inscriptions just quoted, at Delphoi the fee was four obols for a private consultation and seven drachmae and two obols for a public one; at Amorgos it was a drachma

18. "Symposium on Cast Iron," *Proceedings of the American Society for Testing Materials,* XXXIII (1933), 118; Thomas Arthur Rickard, *Man and Metals* (New York, 1932), II, 887: "The making of cannon, and more particularly of cannon balls, was the chief incentive to the invention of cast iron."

19. Hugo Blümner, *Technologie und Terminologie der Gewerbe und Künste bei Griechen und Römer* (Leipzig, 1887), IV, 355; idem, "Eisen," *RE,* X, 2148; Georg Karo, "Eisen," *RV,* III, 64; H. Garland and C.O. Bannister, *Ancient Egyptian Metallurgy* (London, 1927), 108; Gerald Averay Wainwright, "The Coming of Iron," *Antiquity,* X (1936), 23; Rickard, "The Primitive Smelting of Iron," *AJA,* XLIII (1939), 87.

20. Kurt Kluge, *Die antike Erzgestaltung und ihre technische Grundlage* (Berlin, 1927), 129. Thomas T. Read, "The Early Casting of Iron; A stage in Iron Age civilization" *Geographical Review,* XXIV (1934), 546, sits on the fence by stating that "Greeks and

Natural History, XXXIV 146

Mirum, cum excoquatur vena, aquae modo liquari ferrum postea in spongeas frangi.

This passage proves, on the contrary, that cast iron was unknown in Pliny's time, because he reports as a wonder (*mirum*) that occasionally in the process of reducing the ore (*excoquo*) small pieces of metal melt;[21] this happens if the temperature of the oven becomes too high. Aristarchos of Samos[22] as early as the third century B.C., when confronted with a passage of the Iliad mentioning cast iron, stated categorically that iron cannot be melted. This proves that the discovery of the method of producing wrought iron by reducing the ore caused the process of smelting iron to be forgotten. This is confirmed by the circumstances that objects of cast iron preserved in temples were looked upon as a marvel. Pausanias[23] describes as θαύματος an iron statue of Herakles which was at Delphoi, and remarks that it must have been a difficult thing to make (πόνου συμβέβηκεν εἶναι πλείστου). He adds also that its maker Tisagoras was an unknown character. The object was so unusual that he points out that a similar wonder, consisting of the iron heads of a lion and of a boar, could be seen at Dionysos' temple in Pergamon. He reports[24] also that an iron chair was kept inside the temple of Apollo at Delphoi, near the sacrificial pit; it was known as Pindar's throne, because the poet was supposed to have sung some of his compositions while sitting on it. According to Pausanias the

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Romas seldom used cast iron"; so does Oliver Davies, *Roman Mines in Europe* (Oxford, 1935), 57, who maintains that "cast-iron was probably known to the Greco-Roman world, though rarely used."

21. This passage is so interpreted by Read, *loc. cit.*, and John Newton Friend, *Iron in Antiquity* (London, 1926), 93.

22. *Scholium ad Iliadem* XXIII 836.

23. X, XVIII, 6; Pausanias IV, XXXI, 10, mentions also a statue of Epameinondas, son of Kleommis, in the temple of Asklepios at Messene. James George Frazer, *Pausanias' Description of Greece* (London, 1913), III, 434, identifies this Epameinondas with the famous general, son of Polymnis; but I would not be so sure of it, because elsewhere (IX, XII 6) Pausanias calls the Boeotian general son of Polymnis.

24. IX, XXIV 5.

art of casting iron and of making statues of it was discovered by Theodoros of Samos—a mythical Leonardo da Vinci of the Greeks, architect, sculptor, technical inventor—who built the edifice called Skias in Sparta:

III, XII 10

ταύτην τὴν Σκιάδα Θεοδώρου τοῦ Σαμίου φασὶν εἶναι ποίημα, ὃς πρῶτος διαχέαι σίδηρον[25] εὗρε καὶ ἀγάλματα ἀπ' αὐτοῦ πλάσαι.

Pliny, too, lists as a wonder objects of cast iron:

XXXIV 141

Est in eadem urbe (sc. Rhodi) et ferreus Hercules quem fecit Alcon laborum dei patientia inductus. Videmus et Romae scyphos e ferro dicatos in templo Martis Ultoris.

These objects must have been of cast iron, because even today this metal is the only iron which becomes fluid enough at a readily available temperature to allow the casting of statues and of objects with thin walls. The Alkon mentioned by Pliny is probably to be identified with an Alkon, son of Hephaistos, and with the smith Alkon mentioned in the Iliad.[26]

All this proves that the method of producing cast iron had been known during the Greek Dark Ages, but had been forgotten in historical ages. In classical times, the method of producing the Spartan iron obols was either kept as a secret – metallurgists have been inclined to be secretive in all times – or was badly understood. In the light of this evidence it is possible to solve the key problem in the archaeological interpretation of the Homeric poems: that of explaining how it happens that, although iron is often mentioned, weapons are not made of iron.[27] The answer may be that the only iron then known was cast iron which is not fit for the manufacture of objects which have to withstand repeated shocks or need a sharp edge.

25.George Parrot, "Une correction au texte de Pausanias III, 12, 10,*Strena Helbigiana* (Leipzig, 1900), 228, would like to emend σίδηρον into χαλκόν.

26. "Alkon," *R.E.*, I 1879, nos. 7, 8.

27. Andrew Lang, *The World of Homer* (New York, 1910), 97; Humphrey Michell, *The Economies of Ancient Greece* (Cambridge, 1940), 120.

This explanation is confirmed by the specific mention of cast iron in the Iliad:[28] the prize in a disk-throwing competition is the disk itself, which is of iron and described as *αὐτοχόωνος*. The most varied interpretations have been given to the adjective *αὐτοχόωνος* to deny that it is a reference to cast iron.[29] But Aristarchos of Samos,[30] although he was convinced that iron cannot be melted, never doubted that it was a reference to melted metal; he suggested that the disk is of bronze, even though the poet uses the word *σίδερος*, or the adjective *αὐτοχόωνος*, which is properly applied to bronze, is applied to iron by extension. This proves that for the Greeks the word *αὐτοχόωνος* conveys unequivocally the idea of melted metal. It has been argued that it has to be translated as "self-smelted," meaning that the iron in question is of meteoric origin,[31] but this interpretation assumes that Homer had a knowledge of physical theories on the origin of meteorites, of which we have no evidence. Furthermore, if meteoric iron was called "naturally smelted," this would imply that non-natural methods of smelting the ore were also known. The meaning of *αὐτο–* in the compound *αὐτοχόωνος* is made clear by the forms *αὐτόξυλος*, "of one piece of wood," *αὐτογενής*, "sprung from the same stock," *αὐτοπαγής*, "compact,"; hence *ἀυτοχόωνος* means "cast in one piece."

The speech by which Achilles invites competitors to vie for the possession of the disk also intimates that it is made of cast iron:

Iliad XXIII 832

εἴ οἱ καὶ μάλα πολλὸν ἀπόπροθι πίονες ἀγροί,
ἕξει μιν καὶ πέντε περιπλομένους ἐνιαυτοὺς
χρεώμενος· οὐ μὲν γάρ οἱ ἀτεμβόμενός γε σιδήρου
ποιμὴν οὐδ' ἀροτὴρ εἶσ' ἐς πόλιν, ἀλλὰ παρέξει.

28. *Il.* XXIII 826.

29. E.g., Thomas Day Seymour, *Life in the Homeric Age* (New York, 1907), 299, "unwrought iron"; Davies, *op. cit.*, 57, "a bloom of iron."

30. *Loc. cit.*

31. Rickard, "Primitive Smelting," 86; cf. Michell, *op. cit.*, 120 n5; Georg Finsler, *Homer,* vol. 2 (Berlin, 1914), I, 129, translates "natürliches Roheisen."

Achilles states that the iron will be of use, if the winner is the owner of much land. In such a case it will allow him to provide his herdsmen and plowmen with all the iron they need for five years, so that they shall not be in need of interrupting their work to fetch iron in the city. The iron then known was fit only for the manufacture of some specific tools; these tools may be plowshares, grubbing hoes, bits, and other agricultural implements which do not have to stand frequent shocks and do not need a sharp edge, and therefore, may be satisfactorily made of cast iron.[32] However in the long run such objects, if made of cast iron, are bound to break, and this is possibly the reason why it is stated that the supply is going to last for five years; if these tools were made of bronze or of wrought iron, they would last a lifetime.

The conclusion that cast iron was used in the Greek Dark Ages may be of startling significance for the science of prehistoric archaeology. Many problems should be re-examined to see whether they can be solved by assuming that cast iron – which is smelted like copper and processed like bronze – was known before wrought iron. The reason why iron was known for centuries before it became of general use, may be that only the discovery of wrought iron made iron a metal which could compete with bronze.

32. Victor Bérard, *Les Phéniciens et l'Odysée* (Paris, 1902), I, 435, although he does not consider the possibility of the use of cast iron, maintains that this passage of the Iliad can be explained by assuming the existence of a "fer primitif," which was too brittle for the manufacture of weapons, but was good enough for the manufacture of agricultural implements.

5. Weighed Currency

Once the nature of the long thin iron spits of the Heraion has been defined, the next problem is to ascertain the purpose of the solid lingot which was found with them, and to explain why they were set up as sacred property (ἀνάθημα) together.

There can be no doubt that the solid lingot is a standard of weight; but if it is a standard of weight, what does it have to do with the neighboring objects which are not weighed? When confronted with this problem, Svoronos,[1] although he had recognized that the ὀβελίσκοι are utensil-money defined by shape, made the hypothesis that they are also measured by weight and that the solid lingot is a reference weight used in their manufacture. This explanation, which has been accepted by Seltman,[2] is hardly satisfactory, because the idea of weight is foreign to the nature of utensil-money; besides, if the ὀβελίσκοι had been measured by weight, there would have been no need to make them of a certain definite shape, since weight provides a more exact standard. If the ὀβελίσκοι had to conform both to a certain definite shape and to a certain weight, their manufacture would have been quite a problem for

1. *Op. cit.,* 198.

2. *Athens,* 121

the metallurgists of ancient Greece who were able to make silver coins of the same weight, but not of the same contour.

Even supposing that a reference weight was necessary for the manufacture of ὀβελίσκοι, one or a few ὀβελίσκοι would have been much more useful than a solid lingot weighing as much as 180 of them. The solid lingot could be used only to test whether 180 ὀβελίσκοι are of a certain average weight. And it is this idea of average weight embodied in the solid lingot that can give the key to the problem. If, on the one hand, there is a bundle of 180 ὀβελίσκοι and, on the other, there is a solid lingot of the same weight, this means that the purpose of the lingot was to find the average weight of the ὀβελίσκοι. They were so different in weight that 180 of them were necessary to get a good average.

My interpretation is that at a certain point somebody decided to measure the iron currency according to weight – as was done for the silver currency – and for this purpose dedicated the objects of the Heraion. Although, to those used to weighed currency, it may seem self-evident that a piece of iron of the same weight as that of a roasting spit has the same value as the roasting spit, this concept is not easily accepted by those used to judging money according to shape. It would be difficult, indeed, to convince the natives who use millstones as money that a rock of the same weight has the same value; conversely, as the dialogue *Eryxias*[3] points out, an Athenian would not have given any monetary value to all the stones of the Agora, while the Ethiopians accepted shaped stones as money. Therefore, since the first requisite of money is acceptability, those who thought of applying weight to iron currency had to convince the public; to this effect, they put on an exhibition at the Heraion, on one side a bundle of ὀβελίσκοι of the usual shape, and on the other, a solid lingot of the same weight as the bundle. To dramatize the equivalence between the two, the lingot was made rectangular and

3. 400 d.

of the same length as the ὀβελίσκοι, with an end flattened out to suggest the spear-like end of the ὀβελίσκοι. It is possible that originally the two objects were exhibited hanging on the two opposite sides of a scale.[4]

The result of this procedure was to create a new sort of ὀβελίσκος measured by weight and not defined by its function as a utensil. As such an ὀβελίσκος has actually been found in Sparta. At the temple of Artemis Orthia and on the Akropolis, there came to light a number of rectangular bars of various length, never longer than a foot, which in some cases have an end shaped like a spear. Arthur Maurice Woodward,[5] who has studied them, thought that they were fragments of ὀβελίσκοι, but was puzzled by the fact that they were much thicker than the ὀβελίσκοι of the Heraion. He thought that this could be explained by assuming that the rust and impurities had increased their weight; but, even allowing a 50% increase in weight for such causes, the bars of Sparta are heavier than a fragment of an ὀβελίσκος of the Heraion of the same length. I suggest that the objects of Sparta are in fact fragments of the new ὀβελίσκος that, being measured by weight, no longer need to be made long and thin, but in some measure retain the general idea of the original shape.

The new money of weighed obols had the disadvantage of requiring the use of scales. Up to the time weighed obols were introduced, the Greeks had not been familiar with the use of the scale, as is proved by the fact that the new currency begot the need of a special expert in weighing, the ὀβολοστάτης, mentioned by Herakleides. It is interesting

4. This is suggested by the fact that the two objects weigh half a mina each. It was customary for the ancients to consider as one unit the two weights on the opposite sides of a balance; this is the origin of the double-mina and of the stater (double drachma or double shekel). If the two objects were on scales, there would have been a full mina on the balance.

5. *The Sanctuary of Artemis Orthia at Sparta,* edited by Richard M. Dawkins (London, 1932), 392.

to notice that the Romans went through a similar development. The *libripens* who, assisted by witnesses, intervenes with this scales in some contracts of Roman law where a transfer of money is involved,[6] is a reminder of an age in which bronze currency was weighed, and only an expert knew the art of weighing it and had the proper facilities.

Since Aristotle refers to the fact that iron money is basically defined by shape, it is likely that Herakleides knew that the original ὀβελίσκοι were not measured by weight. Hence, his sentence πρὸ τούτου (sc. ὀβολοῦ) γὰρ ὀβελίσκοις τραχέσιν ἐνομίστευον τὰ πρὸς σταθμόν) may be translated "before the ὀβολός was introduced, they used rough ὀβελίσκοι as standard in those matters in which we use weight."[7] The original ὀβελίσκοι are said to be τραχύς, because they are a rougher approximation of a standard than the weighed ones; the adjective τραχύς, as the opposite of λεῖος, conveys the idea of a standard which does not conform to what should be its ideal value:

> Solon fr. 2, 32 Bergk[4]
> εὐνομίη ...τραχέα λειαίνει
>
> Plato
> τὸ τραχύ τοῦ νόμου
>
> Plato Cra. 406 a
> τὸ μὴ τραχύ τοῦ ἤθους

Numismatists have attached great importance to Herakleides' statement that Pheidon ἀναλαβὼν τους ὀβελίσκους, ἀνέθηκε τῇ ἔν Ἀργέι Ἥρᾳ. They have used it to prove that Pheidon, having struck silver coins in Aigina, decided to "demonatize"[8] the iron currency; more

6. Bernhard Kübler, "Libripens," *R.E.,* XXV, 140.

7. It is important to notice that Herakleides makes a distinction between ὀβολός and ὀβελίσκος: the latter term is applied only to utensil-money. This is in agreement with the fact that in the sources the weighed iron money of the Spartans was called ὀβολός and not ὀβελίσκος, even though it preserved in some measure the shape of a roasting spit.

8. Gardner, *op. cit.*, 111; Milne, *Greek Coinage,* 17; Wade-Gery, op. cit., 259. The theory of "demonetization" was developed by Ernest Babelon, *Les Orignines de*

specifically, Seltman claims that the objects found at the Heraion were the "minting apparatus"[9] for the production of roasting spits which was dedicated in the temple when their manufacture was discontinued. These interpretations assume that it was possible to make iron money tabu all over Greece by dedicating a sample of it at the temple of Argive Hera, and that there was such a thing as a public mint for the production of roasting spits. The most natural explanation of the presence of these objects at the Heraion is that which has been hinted at by Svoronos,[10] viz. that it was customary to keep reference standards of current measures in temples.

The connection between the coinage ascribed to Pheidon and the setting up of the objects at the Heraion is the product of a late rationalization. In any case, I think that ἀναλαβὼν should be translated as a participle of intention: "wishing to abolish the use of ὀβελίσκοι," Perhaps Herakleides has in mind simply that the coinage ascribed to Pheidon drove the ὀβελίσκοι off the market, and therefore he thinks that having made them useless he dedicated them at the Heraion. But if it is true that Herakleides thought that by the dedication of the ὀβελίσκοι at the Heraion the use of ὀβελίσκοι was banned all over Greece, he was wrong, just as his modern commentators are wrong.

Unless one assumes the all-pervading police power of the modern state, as it has developed since the First World War, a metallic currency cannot be driven off the market except by the working of Gresham's Law. This means that iron currency can be driven off the market only if, by custom or by action of a public agency, such a relation is established

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la monnaie considerées au point de vue économique et historique (Paris, 1897), 207, before the actual discovery of the objects mentioned by Herakleides. Babelon thought that a number of ὀβελίσκοι picked up at random were hung along the walls of the temple as a commemoration of the old currency. But Waldstein's findings prove that the ὀβελίσκοι were set up in a definite number to establish a standard.

9. *Athens,* 122.

10. *Op. cit.,* 199.

between it and silver currency, as to make the iron a "good" currency and silver a "bad" one.

The fact that iron was driven off the market by the working of Gresham's Law is proved by the circumstances that in classical times iron was the only currency in Laconia, where there were the best iron mines of Greece.[11] Iron was cheaper there than in the rest of Greece, as indicated by the above-mentioned relation of 1:1300 between silver and cast iron. In the rest of Greece it was silver which was relatively cheaper and, hence, the only currency. The fact that throughout Greece the use of one currency excludes the use of the other, proves that it is a matter of the working of Gresham's Law, by which, shortly after a relation of value is established between two metallic currencies, one is bound to go off the market.

Neither Pheidon nor any other Greek ruler could have banned the use of iron currency, even in the territory under his direct authority, much less the whole of Greece. It is true, however, that it was the specific relation of value (μέτρα) between iron and silver, associated with the name of Pheidon, which by the working of Gresham's Law drove iron currency our of circulation.

Whether it is true or not that according to Greek religion money can be dedicated in a temple to make it *tabu*, it is a fact that the dedication (ἀνάθημα) of an object in a temple could be a method of setting up a model. According to Greek legends, Palamedes who, like Pheidon, was considered the inventor of μέτρα καὶ σταθμὰ, having invented dice, set them up in the temple of Tyche in Argos.

> Pausanias II, XX 3.
>
> Τύχης ἐστὶν ἐκ παλαιοτάτου ναός, εἰ δὴ Παλαμήδης κύβους εὑρὼν ἀνέθηκεν ἐς τοῦτον τὸν ναόν.

It is obvious that this alleged dedication was not made for the purpose of banning the use of dice, which Palamedes had just invented.

11. Stephanos Byzantinus s.v. Λακεδαίμον; Davies, *op. cit.*, 254; Michell, *op. cit.*, 121.

6. Agio

The iron objects of the Heraion were set up to spread the use of weighed iron as a medium of exchange. They represent the application to iron currency of a concept which was originally foreign to it, that of currency accepted at a certain value because of its worth as a commodity.

While the Greeks of the Dark Ages were using as a medium of exchange utensil-money of bronze and later of iron, their contemporaries of the kingdom of Egypt and of the Assyrian empire were using weighed silver and gold, and had been doing so for centuries, Both in the countries of Egyptian culture and in those of Babylonian-Assyrian culture the unit used to weigh these metals was the mina. There were many varieties of mina; however, they were not greatly different in weight from an Egyptian mina, which from the beginning of the First Egyptian Empire (fifteenth century B.C.) to the kingdom of the Ptolemies had the constant and precise weight of 485 grams.[1] The great difference lay in the fact that in the countries under Babylonian-Assyrian influence the mina had multiples and submultiples according to a decimal system: the double mina was divided into ten *deben*, and the *deben* into ten *kedet*.

1. Segrè, *Metrologia,* 14.

When the Greeks imported the idea of weighed metals as a medium of exchange, they also adopted the mina as a unit of weight. All the systems of units of weight and value in Greece are based on the silver mina; the barbarian name of which has been Hellenized into μνᾶ. All over Greece the silver mina has a value of ca. 430 grams.[2] All over Greece we find also the use of the sexagesimal multiple of the mina which the Greeks called talent. The sexagesimal submultiple, the shekel, the Semitic name of which has been Hellenized into σίγλος, was used as the basic unit in the early coinage of Lydia, Ionia and the islands of Rhodes and Melos.[3]

The findings of the Heraion prove that this sexagesimal submultiple was once used also in Greece proper. Seltman[4] has pointed out that, since the bundle of the Heraion is composed of 180 ὀβελίσκοι, it must have been decided that a silver mina was equal to 60 drachmae, that is, 360 ὀβελίσκοι. The bundle and the solid lingot of the Heraion represent the value of half a mina each; if it is true that they were exhibited on a scale, then the value of a mina was on the scale. In other words, when weighed silver came in contact with the already accepted currency of ὀβελίσκοι, there was felt the need of establishing a relation (μέτρα) between the two. It was decided that it would take 360 ὀβελίσκοι to make a silver mina or that it would take 6 ὀβελίσκοι to make a shekel. It is possible that the unit called drachma, the handful of ὀβελίσκοι, came

2. The first requirement for a clear understanding of Greek metrology is to recognize the existence of a pan-Hellenic mina. This fact began to be accepted in vague terms by Oskar Viedebannt, *Antike Gewichtenormen und Münzfüße* (Berlin, 1923), 41, and by Seltman, Athens, 123, in more outspoken terms. The first to speak openly of a "pan-Hellenic mina" was Théodore Reinach, "À propos de la loi delphique de Cadys sur le prêt à interêt," *BCH,* LI (1927), 172. The idea is opposed by Regling, "Mina," *Wörterbuch der Münzkunde,* edited by Friedrich von Schrötter (Berlin, 1930), 391, who believes in the existence of "many local minae."

3. Seltman, *Greek Coins,* 42 *et passim.*

4. *Athens*, 119.

into existence at this time as the equivalent in iron of the silver shekel.

Having made the revealing statement that the bundle of the Heraion embodies a division of the mina by 60, Seltman was confronted with the fact that the earliest coins of Greece proper, those of Aigina and Athens, embody a system in which the mina is divided into 70 drachmae. He must have thought that this circumstance added an unpleasant difficulty to the problem, because he tried to gloss over it by stating on one page[5] that the drachma of the Heraion was 1/60 of a mina and a few pages later[6] that it was 1/70 of a mina. In this way he impaired the value of the piece of information he had himself brought ot light.

It is true, as Seltman assumes, that the earliest coins of Aigina and of Athens must have been struck on the basis of the system of weights of the Heraion, but there is also a perfectly good reason why the drachma of the Heraion should be 1/60 of the mina and the drachma of these coins 1/70 of a mina. In those coins which are based on a division of the mina by 60, the unit is called shekel, whereas in those coins which are based on a division of the mina by 70, the unit is called drachma; the name drachma shows that the change from 60 to 70 is due to the influence of iron currency. The objects of the Heraion embody a relation between iron drachma and silver mina, whereas those of Aigina and Athens before Solon embody a relation between silver drachma and silver mina. An iron drachma is 1/60 of a silver mina, but a silver drachma is 1/70 of a silver mina; the difference is due to the economic factor of *agio*.

In a paper[7] which he considered epoch-making, Carl Friedrich Lehmann-Haupt called attention to the fact that many weights of

5. *Greek Coins,* 35.

6. *Op. cit.*, 42.

7. "Die Herleitung der herrschenden Gewichts- und Münzsysteme des Altertums aus dem altbabylonischen Gewichts- und Doppelwährungssystem," *Sitzung-Berichte Berliner Archäologische Gesellschaft, Anzeiger,* Nov. 1888.

the ancient world exist in two varieties: one lighter, which he called *Gewicht gemeiner Norm* and the other heavier, which he called *Gewicht erhöhter Norm.* This was the starting point of a polemic on the reasons for this phenomenon between Lehmann-Haupt, who was followed by the metrologists of the *jüngere Schule,*[8] and Oskar Viedebannt, who was followed by the metrologists of the *ältere Schule.*[9] Writings stuffed with impressive arrays of figures were published and sharp words were exchanged, but no final scientific result was achieved. Furthermore, the field of Greek metrology became such an esoteric one that very little has been written on it for the last score of years.

Both sides failed to consider that the existence of a heavier and a lighter variety of the same unit of weight can be explained by the economic factor of agio. If a relation of value is established between two currencies, it follows that a given amount of one can be interchanged with a given amount of the other; however, it may happen that one currency is practically less desirable than the other, so that the public prefers to have a given amount of one rather than the corresponding amount of the other. When such a situation arises, the party who owns the more desirable currency is not willing to exchange it unless it receives a premium, agio, for the advantage which he is willing to trade. For instance, in those countries where prior to the First World War gold and silver used to circulate as currency, gold pieces were at agio over the corresponding amount of silver, because less bulky. In a similar way, bills of exchange that enjoy full confidence are at agio over gold.

Although this rule goes beyond the field of Greek metrology, for the purposes of the present paper it is sufficient to state that whenever in Greece the same weight appears in two varieties, one heavier and one

8. The case for the jüngere Schule is summed up by Lehmann-Haupt in "Gewicht," *R.E.* Suppl. III, 587.

9. The case for the ältere Schule was summed up by Viedebannt, *op. cit.*

lighter, this is due to the phenomenon of agio. The agio is called by the Greeks ἐπικαταλλαγή, because it is taken into account by asking the party who trades the practically less desirable commodity to throw into the bargain an extra amount. This extra amount is calculated by adding, on the pan of the scales which carries the weights, an extra weight called ῥοπή. Sometimes this ῥοπή is one of the weights readily available, so that, in a case I shall examine later, a ῥοπή of a mina (20%) is added to 5 minae, whereas the ῥοπή of a πεντάμνουν (12%) is added to a talent. At other times, to make the operation of weighing simpler, the rJophv is consolidated into the weight to which it is usually added, so that there follows the creation of a system of weights slightly heavier (*Gewicht erhöhter Norm*) than a similar system of weights. The lighter variety was always used to weigh a commodity which was practically less desirable.

In the specific case in question, it is easy to see that it makes a great deal of difference whether one receives payment in silver drachmae or in iron drachmae; the half mina of the Heraion weights 73 kg. and, according to Plutarch,[10] ten minae of iron would fill a large storeroom and require a yoke of oxen for transportation. As a result, the party who was paying with iron drachmae instead of silver shekels had to add, as agio, something extra which proves to be an ὀβελίσκος for each drachma of six ὀβελίσκοι; hence, it took 70 and not 60 iron drachmae to make a silver mina. Thereby the equivalent in silver of the iron drachma of six obols came to be not 1/60 but 1/70 of the silver mina; this brought about the creation of a new unit for weighing silver, which was called , because it is the silver equivalent of the iron drachma.

Since the drachma of six obols was the established unit of value in Greece proper, the silver drachma completely supplanted the silver shekel, which continued to be used only by the Greeks of Ionia and of some of the Aegean islands.

10. *Lycurgos* IX.

The stage of development in which were used a drachma of six obols and a drachma with something more added, is reflected in the Locrian code of laws ascribed to Zaleukos:

Hesychios, s.v. λεπτὰς καὶ παχείας

λεπτὰς καὶ παχείας Ζάλευκας ἐ Νόμοις τὰς δραχμὰς, λεπτὰς μὲν τὰς ἑξωβόλους, παχείας δὲ τὰς πλέον ἐχούσας.

This passage reveals that Zeleukos' legislation was passed in a period in which weighed iron was used together with silver currency, on the basis of μέτρα of six ὀβελίσκοι a shekel, but the problem of the agio of silver over iron had not yet been definitely settled. This legislation has therefore to be dated in a period which extends from the dedication of the Heraion to the adoption of φειδώνεια μέτρα. There were in use two iron drachmae: one, the normal one of six ὀβελίσκοι, and the other, a drachma to which something had been added (ἐπικαταλλαγή) to take agio into account.

Unluckily, there is no reliable information on the exact date of the Locrian legislation, since the information according to which it was the oldest body of written laws of Greece, and the date of 663/2 B.C., reported by Eusebios,[11] are the product of speculation.[12] It can only be said that Zaleukos' laws belong to the same general period as those of Drakon.

11. *Anno Abrami* 1363 Schoene II 86; this date is arrived at by counting forty years, that is, a generation, from the supposed date of Drakon's legislation.

12. Eduard Meyer, *Geschichte des Altertums,* vol. II (Stuttgart, 1937), III, 522 n. 2; Gaetano de Sanctis, "Zaleuco," *E.I.* XXXV, 871; Emanuele Ciaceri, *Storia della Magna Grecia* (Milano, 1927), II, 24.

7. The Meaning of φειδώνεια μέτρα

If instead of making 69 iron drachmae equal to a silver mina and then adding extra iron as agio, the relation (μέτρα) was directly calculated at 70 drachmae to a mina, this relation was called φειδώνεια μέτρα or μέτρα τὰ φειδώνεια καλούμενα.[1] This phrase means "short relation." According to this relation the drachma is worth less silver than according to the one which does not take agio into account.

From the root of the verb φείδομαι, "to be chary of," comes the noun φειδώ; this must have had a parallel form *φειδών,[2] from which is derived the adjective φειδώνιος or φειδώνειος.

Φειδώ, or its equivalent φειδωλία, is the quality of being petty, in the sense of being concerned with trifling gains; it is the quality of not having a sense of proportion in matters of economic profit.

Aristotle *ars rhet.* II 1390 b

> καὶ οὔτε πρὸς τὸ καλὸν ζῶντες μόνον οὔτε πρὸς τὸ συμφέρον ἀλλὰ πρὸς ἄμφω, καὶ οὔτε πρὸς φειδὼ οὔτε πρὸς ἀσωτίαν ἀλλὰ πρὸς τὸ ἁρμόττον,

1. Aristotle *resp. Athen.* X, *resp. Argiv.* fr. 98 Rose; Ephoros fr. 115 Jacoby.

2. A form φειδώς is documented in a gloss (Liddell and Scott, s.v.). The forms in -ώ and in -ών, although of different origin, are often confused (Chantraine, *op. cit.*, 117, 160). A number of nouns in -ών are declined like those in -ώ. Some nouns have both forms, as in ἀηδώ, ἀηδών

The concept of φειδώ is associated with that of μικρολογία and that of μικροπρεπεία, as appears best of all from a reading of the *Characters* of Theophrastos and of the *Epistulae Rusticae* of Alkiphron. In dealing with the character of the μικρόλογος, the man who proves himself a miser in trifling matters, Theophrastos states (X. 1): ἔστι δὲ ἡ μικρολογία φειδωλία τοῦ διαφόρου ὑπὲρ τὸν καιρόν. "Pettiness consists in grudging small differences when the case would not warrant it." The μικρόλογος maintains that the many petty differences he insists upon (φειδωλία) will mean quite a deal at the end of the year (ibid. 13). When he goes to a public bath he carries the oil to annoint himself in a very small oil flask (ibid. 14: ληκύθιον μικρόν). The ληκύθιον is a little oil flask which is so small that in Aristophanes' *Ranae*[3] the statement ληκύθιον ἀπώλεσεν is cause for repeated laughter. Hence, a ληκύθιον μικρόν must be small indeed and, possibly, may be identified with the φειδών, an oil container mentioned by Pollux:

X 179

> εἴη δ' ἂν καὶ φείδων τὶ ἀγγεῖον ἐλαιηρὸν, ἀπὸ τῶν φειδωνίων μέτρων ὠνομασμένον, ὑπὲρ ὧν ἐν Ἀργείων πολιτείᾳ Ἀριστοτέλης λέγει

The relation between the oil container φειδών and the φειδώνεια μέτρα is a pure speculation of Pollux who had found the latter mentioned by Aristotle; Pollux, not having understood the meaning of μέτρα, took it that, as the plural of μέτρον, it meant "measure of capacity." The φειδών is not one of the φειδώνεια μέτρα, as Pollux thinks; but the two words φειδών and φειδώνιος have this much in common, that both convey the idea of being smaller than something else.

In describing the character of the αἰσχροκερδής, the man who is not ashamed to make an unjust profit in trifling matters, Theophrastos calls a measure of capacity smaller than it should be a φειδώνειον μέτρον:

3. vv. 1200-1245

XXX 11

Φειδωνείῳ μέτρῳ τὸν πύνδακα εἰσκεκρουμένῳ μετρεῖν αὐτὸς τοῖς ἔνδον τὰ ἐπιτήδεια σφόδρα ἀποψῶν

"He deals out in person the victuals to his household using a short measure, the bottom of which has been knocked in, and carefully striking off from the top the overflow." The same individual tries to cheat the public bath of the oil contained in a *ληκύθιον* (ibid., 8). If somebody pays him a small sum in copper, he asks to be paid for the agio (*ἐπικαταλλαγή*) of silver over copper.

Ibid. 15

καὶ παρὰ παιδὸς κομιζόμενος ἀποφορὰν τοῦ χαλκοῦ τὴν ἐπικαταλλαγὴν προσαπαιτεῖν, καὶ λογισμὸν δὲ λαμβάνων παρὰ τοῦ χειρίζοντος.

"If money, which his slave has earned working for hire, is paid him in copper, he demands the agio and calls the steward to calculate it for him." Most editors[4] have judged this passage as corrupt and in need of emendation, because they could not understand its full meaning. This passage shows that the insistence on collecting the amount due for agio, may be called *φειδώ*. In the same spirit, since the allowance for wear and tear of coins enters into the concept of agio,[5] Theophrastos calls a boor (*ἄγροικος*) one who refuses coins because they do not come up to their due weight.

IV 13

καὶ τὸ ἀργύριον δὲ παρά του λαβὼν ἀποδοκιμάζειν, λίαν γὰρ λέγων λεπτὸν εἶναι, καὶ ἕτερον ἅμα ἀλλάττεσθαι.

On the contrary, one who wants to appear splendid pays a debt of a mina entirely in new coins (XXI 3).

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4. Richard Claverhouse Jebb, *The Characters of Theophrastus,* A New Edition Edited by John Edwin Sandys (London, 1909), 208; Octave Navarre, *Theophraste: Charactères* (Paris, 1920), 71, n. 11.

5. *The Century Dictionary and Cyclopedia,* vol. II (New York, 1912), s.v. agio.

Alkiphron too calls a "short measure" φειδωλὸν μέτρον:

III 21, 1 Schepers

περὶ τὰς δόσεις κατέστη μικροπρεπέστερος καὶ φειδωλῷ τῷ μέτρῳ κέχρηται.

In the light of this passage of the similar one of Theophrastos, it is possible to understand the meaning of μεδίμνοι φειδωνείοι in an inscription of Delphoi:

Ἀπολλων[ιᾶται] κριθᾶν μεδίμνους φειδωνείους τρισχιλίους, ἐκ τούτων ἐγένοντο μέδιμνοι δελφικοὶ χίλιοι ὀκτακόσιοι ἑβδεμήκοντα πέντε·

It is a question of "short medimni," that is medimni that are 5/8 of those used at Delphoi, as the inscription explains. Because of the general misunderstanding of the phrase φειδώνεια μέτρα, Émile Bourguet,[6] the editor of this inscription, has used this text to determine the content of the measures of capacity allegedly established by Pheidon.

Quite significant is the fact that has the meaning "to make a measure short" in a passage of Hesiod, which up to now has been badly understood:[7]

Works and Days, 368

ἀρχομένου δὲ πίθου καὶ λήγοντος κορέσασθαι,
μεσσόθι φείδεσθαι: δειλὴ δ' ἐνὶ πυθμένι φειδώ.

"In making a wine-jar make it full at top and bottom and be chary at the middle, because the saving at the bottom does not pay."

The poet means that the buyer of wine will pay attention to any shortcoming of the jar at the top and, in particular, at the bottom,

6. "Inscriptions de Delphes," *BCH*, XXVII (1903), 13; idem, "Note sur le système métrologique de Phidon," *Revue Archéologique,* II (1903), 25; Robert Cohen, *La Grèce et l'hellénisation du monde antique* (Paris, 1934), 117.

7. Ulrcih von Wilamowitz-Moellendorf, *Hesiodos Erga* (Berlin, 1928), ad. h. l., gives the following interpretation: when a jar is opened the wine tastes so good that one must have his fill; later, one must save it, but not so long as to let the remainder become vinegar.

whereas the fact that the middle is somewhat narrow may escape his notice. It must be stressed that the noun φειδώ means here the action of making a measure short.

The root of the verb φείδομαι was also used to compound personal names like Φείδιππος, "he who spares the horse" and Φειδόλαος, "he who spares the people," and, since the short form of these names is Φειδών, which suggests φειδώ, this was the inevitable source of puns. The pun on the name Pheidippus plays an important part in Aristophanes' *Nubes*.[8] Φειδών is a common jocular name for a penny-pincher and it is considered an equivalent of φειδωλός, "niggard."[9] In Alkiphron, Pheidon and Gniphon, "the stingy," are the personification of μικροπρεπεία:

II 32, 3 Schepers

οἱ λοιποι δὲ τῶν Ἀθήνησι νεοπλούτων Φείδωνός εἰσι καὶ Γνίφονος μικροπρεπέστεροι

Alkiphron (IV 2, 5) considers the characters of Φειδόλος and of Χρέμης as equivalent.[10]

In conclusion, the survey of the semantic value of φειδώνειος and of Φειδών explains how it happened that the Greeks, who habitually ascribed the origin of social institutions to a specific individual, associated the φειδώνεια μέτρα, "short relation" with a Pheidon variously identified.[11]

8. 420; φειδωλός 835 φειδωλία

9. *Anthologia* I 118; Mnesimachos fr. 4, 7 Kock.

10. Aristophanes, *Poetica*, fr. 191 Kock, associates Pheidon and Chremes

11. Pheidon is described as a king or as a tyrant of Argos and is variously dated from the ninth to the sixth century B.C.; cf. W. Schwabacher, "Pheidonischer Munzfuss," *RE,* XXXVIII, 1946. Some sources make him a Corinthian. The Pheidon of Argos of the Macedonian genealogies was originally the Pheidon, king of the Thesprots, mentioned in the Odyssey.

8. The Phrase μέτρα και σταθμά

Lehmann-Haupt[1] has stressed the point that in the Ancient World weights exist first of all for the purpose of weighing precious metals. This general principle is confirmed by the fact that Greeks did not have a system of weights until weighed silver was introduced as a medium of exchange. All Greek systems of weight are based on the silver mina of *ca*. 430 grams which, as we shall see presently, is called after the Heraion of Argos. Even in historical times, the only important units of weight are those used for coins, as is shown by their being quite exact, whereas reference weights for merchandise vary one from the other as much as 50% and occasionally more.

The literary evidence, too, proves that weights were not used in Greece before silver currency was introduced and evaluated in relation (μέτρα) to the iron money. All the sources which speak of the invention of wights (σταθμά) make it depend on the invention of μέτρα, that is, the relation between the iron drachma and the silver mina. The invention of μέτρα καὶ σταθμά is ascribed either toe Pheidon or to Palamedes. The words μέτρα καὶ σταθμά, in that order, form a standard phrase so common that the noun σταθμος which in Homer had a regular plural σταθμοι, acquired by assimilation an heterogeneous plural σταθμά, which is the one usually found in classical writers.

1. Historisch-metrologische Forschungen," *Klio,* XIV (1914), 365

There are a few instances in which the invention of μέτρα is mentioned without any reference to σταθμά; the only one of consequence is Herodotos VI 127, where the invention of μέτρα is mentioned alone, because it is a matter of explaining that Pheidon of Argos is the one who gave the name to the φειδώνεια μέτρα. But there is no single instance in which there is mention of the invention of σταθμά alone.

The association of μέτρα with σταθμά is so close that Isidorus of Seville, drawing on a Latin writer of the best age,[2] translates μέτρα καὶ σταθμά by *ponderum ratio* as if it were an hendiasys:

Origines XVI 23, 2

Primus Phidon Argivus ponderum rationem in Graecia constituit.

We shall see how μέτρα καὶ σταθμά καὶ νόμισμα is a technical phrase to indicate the standard of coinage.

All this reveals that a system of weights was introduced only when weighed silver was adopted as a currency, and that to adopt silver as a currency it was necessary first to establish a relation with the accepted unit value, the ὀβελίσκος. The establishment of a relation of value between silver, which was a continuum measured by weight, and the ὀβελίσκοι,which were individual units defined by shape, extended to the iron currency the concept of continuum measured by weight. This extension is embodied in the findings of the Heraion. The result was the creation of a bimetallic system of currency. But bimetallic systems of currency cannot last long, because no matter how carefully the relation is set, one metal is bound to become "good" in relation to the other. In this particular case, iron currency was drive off the market in most parts of Greece, where the accepted relation was favorable to silver, according to the local conditions of the market. In Sparta, on the contrary, conditions of the market were such as to make the same relation favorable to iron, so that silver was driven off.

2. Hans Phillip, "Isidoros," *RE*, XVIII, 2077.

9. Euboic Mina

The iron findings of the Heraion can provide further evidence if one considers the locality in which they were found.

Pausanias (II. XVII 2) states that the Heraion was built on the lower part of a hillock called Euboia and that the region around the sanctuary is called Euboia. According to Pausanias (II, XVII 1) and Plutarch[1] Euboia is the name of a nurse of Hera. Waldston calls attention to the "intimate connection [of Hera] with the cow, the sacred herds at the temple, the position of white cows in her rites, and perhaps the immediate relation of the of the βοῶπις goddess herself to the cow into which she changed herself and with which the myth of Io is so curiously connected, and finally the transplanting of these associations into the Hera-cult of other districts."[2] These facts point to an original Mycenaean cow-cult which later was transformed into, or associated with, that of Hera.[3] In any case, it is safe to conclude that Hera was worshiped as Εὔβοια, "protectress of the cow." This name may have faded in importance when the influence of the temple grew beyond the

1. *Quaest. conv.* III 657 e.

2. *Op. cit.* I 6.

3. Cf. Martin P. Nillson, *The Minoan-Mycenaean Religion and its Survival in Greek Religion* (Lund, 1927), 431; "Hera was undoubtedly connected with the cow."

field of interest of the neighboring cowherds. It is surprising that Pier Antonio Pacifico, who traveled through the region at the end of the seventeenth century A.D.,[4] calls the temple *tempio dell' Euboea.*

In the light of this, it is clear that the adjective Euboic (Εὐβοίκος), which we find applied to the mina and to the talent, has no relation with the island of Euboia, as is believed. Euboic units are those adopted at the Argive Heraion and connected with the object found there. This interpretation is confirmed by the *Etymologicum Magnum*:

> Εὐβοικὸν νόμισμα: ἐπειδὴ Φείδων ὁ Ἀργείων βασιλεὺς, ἐν Εὐβοίᾳ χωρίῳ τοῦ Ἄργους, πρῶτος ἔκοψε χρυσὸν νόμισμα. ὠνόμασται δὲ τὸ χωρίον ἀπὸ Εὐβοίας τροφοῦ τῆς Ἥρας.

There can be no doubt that the locality in question is that of the Heraion.

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4. This Venetian priest travelled through Morea on the even of Francesco Morosini's campaign (1685 A.D.) for its conquest. There are various reports of his trip. Of the most detailed one, which is also the least organized, because places are mentioned in the order he saw them, I have been able to find only a German translation, *Beschreibung der Provinzien aus denen die so berühmte Halb-Insel Morea besteht … aus den italienischen dess D.P.A.P. übersetzt,* printed in appendix to Cristophorus Boethius, Ruhm-belobter triumph-leuchtender und glantz-erhöteter Kriegs-Helm … (Nürnberg, 1687). A shorter version is printed as *Descrittione delle provincie che formano la tanto decantata penisola delle Morea … di D.P.A.P.* (Venezia, 1686); the imprimatur reveals the full name of the author. In the following year, the printer of this edition, Girolamo Albrizzi, published an elaboration of the same in which he appears as the author: *Esatta notitia del Peloponneso volgarmente penisola della Morea divisa in otto provincie …* (Venezia, 1687) Some details not contined in the edition of Nürnberg are to be found in the edition printed by Domenico Lovisa, *Breve Descrizzione corografica del Peloponneso o Morea* (Venezia, 1700). In the preface to this edition, Pacifico states that he collected his material by a *"lungo e laborioso viaggio"* and that he gathered *"l'informazione dei paesani e dei viandanti."* He mentions also the fact that he drew two maps, one of Morea and the other of the whole of Greece, which he dedicated to the republic of Venice. It is likely that he was working for the Venetian intelligence service.

The existence of weights called Euboic, which may be identified with any of the systems of silver weights in Greece, has been the greatest source of misapprehension and obscurity in the field of Greek numismatics. The most varied hypotheses have been made to explain why this or that Greek city should have adopted the standards of the island of Euboia. Conversely, the alleged weights of the island of Euboia have been used to fill the missing links for conflicting theories of the history of Greek coinage.

There is no need of entering into the details of these theories, because the entire tangle can be solved by cutting the Gordian knot. Not only do the Euboic weights have no connection with the island of Euboia, but there is not a single source which speaks of a Euboic drachma; the term Euboic is applied only to the mina and the talent. Since all the monetary systems of Greece have the same mina and the same talent, it is no wonder that numismatists have been able to identify the "Euboic system" with any desired system of coinage.[5] The silver mina adopted by the Greeks was called Euboic to distinguish it from other silver minae, such as the Babylonian.[6] The name of this mina, and the talent thereof, is derived

5. Hultsch, *Metrologie,* 203, 547 and Gardner, *op. cit.,* 124, derive the Euboic standard from the Babylonian gold standard, whereas, according to George Francis Hill, *A Handbook of Greek and Roman Coins* (London, 1899), 38, it was derived from the Babylonian silver mina; Barclay V. Head, Historia Numorum: A Manual of Greek numismatics (Oxford, 1911), XLVI, and Giesecke, op. cit., 28, speak of a Samian-Euboic standard; E. J. Haeberlin, "Die metrologische Grundlagen der ältesten mittel-italischen Munzsysteme," *Zeitschrift für Numismatik,* XXVII (1908), 25, derives it from the Phoenician standard, whereas Viedebannt, *op. cit.,* 41 derives it from the Lydian-Milesian coinage; according to William Ridgeway, *The Origin of Metallic Currency and Weight Standards* (Cambridge, 1892), 222, it developed from the Mycenaean-Homeric gold talent representing the value of an ox, whereas according to Lehmann-Haupt, "Zur metrologischen Systematik," *Zeitschrift für Numismatik,* XXVII (1908), 125, it developed from the unit used to weigh the copper mined in Euboia; finally, according to Milne, Greek Coinage, 42, it was a modification of the Aeginetan standard due to the fact that silver had a higher value in Euboia.

6. E.g., Herodotos III, 89.

from the sanctuary of Hera Euboia. This indicates that it was the Heraion that, by fixing a relation between silver currency and the established iron money, caused silver currency to be accepted throughout Greece.

The reason why the adjective Euboic is never applied to the drachma is that the drachma of Aigina or of early Athens is calculated according to the φειδώνεια μέτρα and this is 1/70 of a mina, whereas the bundle of the Heraion shows that the Euboic system was based on a drachma equal to the shekel, 1/60 of a mina. The only money issued on the basis of a unit which is 1/60 of the Euboic mina is the electrum coinage of Ionia. It is probably because of these electrum (λευκός χρυσός)coins of Ionia that the source of the *Etymologium Magnum* assumes that gold coins were struck at the Heraion.

Numismatists speak also of a "Phidonian system" of weights, but this terminology is based on a misunderstanding of the word μέτρα and must be eliminated as a serious source of confusion. Ancient sources mention only a Euboic mina, a Euboic talent, and a drachma that is related to the mina by φειδώνεια μέτρα.

The basic structure of the Greek monetary system may be summed up in the following way. There is a pan-Hellenic mina that is called Euboic. This mina has a sexagesimal subdivision called the talent; it has also a sexagesimal subdivision called the shekel (σίγλος), but this is used only in the coinage of Lydia, Ionia, and some of the islands. The coinage of Aigina and the first coinage of Athens was based on the drachma calculated as $\frac{1}{70}$ of a mina according to the φειδώνεια μέτρα. The coinage systems of Athems after Solon, and of Corinth, were based on different μέτρα, in which the drachma is $\frac{1}{100}$ of a mina, so that a didrachm corresponds to the Egyptian division of the mina into 50 *kedet*.

The explanation of the original of the adjective Εὐβοικός applied to the mina and to the talent helps also in eliminating the much debated problem of the so-called *Wappenmünzen*. To explain the existence of

weights called Euboic, numistmatists have assumed the existence of early coinage of the island of Euboia, which should have preceded the earliest coinage of Athens. To find evidence of such coinage, they have ascribed to Euboia a group of coins of primitive style known as *Wappenmünzen,* which have a weight identical to that of Athenian coins. By the study of the impression of the minting punch, Seltman has proved beyond any reasonable doubt that they are Athenian issues.[7] Seltman's conclusion, in spite of the material evidence on which it rests, has met strong resistance among numismatists,[8] because if the existence of a system of weights of the island of Euboia is refuted, then the framework of the present theories of Greek metrology collapses.

Seltman himself avoids the necessary consequences of his research and tries to save the hypothesis of a system of weights called after the island of Euboia. To this purpose he assumes the existence of a Mycenaean-Homeric system of weights used to weigh copper; these coper weights "with the great migrations of the Aelians and Ionians" went from Cyme in Euboia to Cyme in Asia, whence they spread and became the basis of the Lydian-Ionian coinage.[9] All this is pure fancy, based on the argument that for the Greeks the island of Euboia "was the nearest and most familiar source of copper."[10] However, modern investigations have proved that there are no copper minerals in Euboia.[11] The ancient sources that mention the presence of copper in Euboia were misled by the name of the town of Chalkis, which may rather be derived from καλχή or χαλκή, the purple murex which was fished for there.

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7. Athens, XVII.

8. Edward S. G. Robinson, review of Seltman's *Athens, NC*, IV (1924), 329; Milne, "The Early Coinage of Athens and Euboea," *NC*, I (1921), 8.

9. *Athens,* 115.

10. *Loc. cit.*

11. Michel, *op. cit.,* 113; Ἐλευθεροδάκη Ἐνκυκλοπαίδικον Λέζικον XII, 410, s.v. χαλκος

10. Palamedes

Our earliest sources ascribe the inventions of to Palamedes, a figure of the mythology of the Argolid plain.[1] He is said to be the son of Nauplios, son of Poseidon, and of the nymph Amymone. He has strong similarities with Palaimon, god of shipwrecks, worshipped in Corinth.[2] Since he has for brothers Mausimedon "the shipwright" and Oiax "the helm," it has been maintained that his name is derived from παλάμη in the sense of "oar."[3] This may well be the true origin of his name, but in the earliest known versions of his myth, his main feature is that of being crafty, in the same way that Odysseus was crafty. This indicates that his name was felt to be derived from παλάμη in the sense of "cunning." Tacitus[4] and Suidas[5] call him Argive, and Pausanias[6] states, as we have noted, that he was said to have deposited the dice he had invented in the temple of Tyche in Argos. But his cult

1. The mythological figure of Palamedes is superficially dealt with by Otto Jahn, *Palamedes* (Hamburg, 1836).

2. Jahn, *op. cit.,* 10; cf. "Palaimon," *Roscher,* III, 1257.

3. Alessandro Ronconi, "Palamedes," *EI*, XXV, 944.

4. Annales, XI 14.

5. s.v. Παλαμήδης.

6. II. XX. 3.

can be located even more precisely within Argive territory. Scholars[7] have associated the cult of Nauplios and Palamedes with the city of Ναυπλία, identified by them with the present city of Ναύπλιον, which is dominated by a lofty rock called Palamidi. However, this conclusion has been hastily drawn. Ernst Meyer[8] has already pointed out that writers of the fifth century B.C. use Ναυρλία as an adjective and speak of Ναυπλίη χώρη,[9] Ναυπλία χθών,[10] Ναύπλιοι λιμένες,[11] Ναύπλιαι ἀκταί.[12] This becomes particularly significant in view of the fact that the Venetians[13] distinguished between Napoli di Romania, the present Ναύπλιον and Nauplio, or Napoli Vecchio, the present locality Μύλοι τοῦ Ναπλίου.[14] It is at Napoli Vecchio that one must locate the city of Ναυπλία mentioned by Pausanias.[15] Euripides in his tragedies refers to the region repeatedlyl and this may be taken as an indication that he had first-hand knowledge of it. From his description,[16] it appears that the Ναύπλιαι ἀκταί are the two promontories of Napoli Vecchio and Napoli di Romania and that by Ναύπλιοι λίμένες hemay mean the two harborages of Napoli Vecchio and Napoli di Romania, or the entire sandy coast between the two,

7. Ernst Curtius, "Phöizier in Argos," *Rheinisches Museum,* VII (1850), 455; Doro Levi, "Nauplia," *EI*, XXIV, 321.

8. "Nauplia, RE, XXXII, 2003.

9. Herodotos VI 76.

10. Euripides *Orestes* 369.

11. Euripides *Electra* 453.

12. Euripides *Helen* 1590.

13. Pacifico, edition of Nürnberg, 1687, 13; edition of Venice, 1687, 121; edition of Venice, 1700, 37; "Napoli vechio" is mentioned by Marin Sanudo in the chronicle of the year 1501, *I diarii di Marino Sanuto* (Venezia, 1880), 1626.

14. This locality is listed on maps as Μύλοι, but the full name Μύλοι τοῦ Ναυπλίου is reported by Anotnios Meliarakes, Γεωγραφία πολιτκὴ καὶ ἀρχαῖα τοῦ νόμου Ἀργολίδος καὶ Κορινθίας (Athens, 1886), 33

15. II. XXXVIII, 2; the city is described as being situated near Lerna.

16. Or. 54: λιμένα δέ Ναυπλίειον ἐκπληρῶν πλάτῃ ἀκταῖσιν ὁρμεῖ

which was fit for beaching the ships of the time.[17] Only when the need was felt for a really good harbor did Napoli do Romania become the only λιμέν. This seems to be the locality mentioned by Diodorus[18] as τῆς Ἀργείας εν Ναυπλίᾳ λιμήν, and this is certainly the Ναυπλία τὸ τῶν Ἀργείων ναύσταθμον of Strabo;[19] the coördinates of latitude and longitude prove that this is the Ναυπλία ἐπίνειον of Ptolemy.[20] But Scylax[21] distinguishes between Ναυπλία as a πόλις and as a λιμήν; the πόλις of Ναυπλία must be identified with Napoli Vecchio. Pausanias[22] sta tes that one could see only the ruins of the city at this time; this agrees with the information[23] that the Argives expelled the Ναυπλιεῖς from their own city. The other Ναυπλία, the λιμήν, continued to exist because it was the harbor and arsenal of the Argives.

The present locality Μύλοι τοῦ Ναυπλίου is, in turn, erroneously identified[24] with the location of the ancient swamp called Λέρνα or Ἀλκυονία λίμνη from Alkyone, goddess of sea storms. This swamp, which was the center of the famous Lernaean mysteries, was supposed to be bottomless (ἄβυσσος) and to be an entrance to Hades. This swamp has to be

17. *Helen* 1586. Karl Lehmannn-Hartleben, "Die antike Hafenlagen der Mittelmeer," *Klio,* Beiheft XIV, 271, tries to explain this phrase by assuming that the bay south of the present Ναύπλιον was a harbor too.

18. IV 33.

19. VIII 368.

20. III 14, 33.

21. 49.

22. II, XXXVIII 2. Pacifico, too, mentions the ruins of the "antica Nauplia," edition of Venice, 1700, 37.

23. Pausanias IV, XXIV 4, XXVII 8, XXV 2; Strabo VIII 373; Theopompos fr. 383 Jacoby.

24. Axel Boethius, "Lerna," *RE,* XXIV, 2085; Herbert Lehmann, *Argolis; Landeskunde der Ebene von Argos und ihre Randgebiete* (Athens, 1937), I, 54. Curtius, *Peloponnesos* (Gotha, 1852), II, 359, to explain how the swamp could be located at Μύλοι supposes that it was a reservoir formed by a system of dikes.

located on the lower course of the river Erasinos; places where a sluggish river forms a swamp were considered by the Greeks as entrances to the Nether World.[25] The swamp received the water of the source Amymone, Palamedes' mother; this source is to be identified with the waterhead of the river Erasinos,[26] which springs from the rocks in the village called at present Κεφαλάρι, "big source," but Palamida in Pacifico's report.[27] The water of this source was supposed to be that of the Stymphalian swamp, another entrance to Hades, which has disappeared in καταβόθρα.[28]

This topographical and antiquarian information reveals that Lerna was the center of worship of a number of sea-gods, among whom were Nauplios and Palamedes – connected with the idea of traveling to and from the land of the dead. They belong to the same pattern as Odysseos, and this explains why Palamedes and Odysseos are presented as bitter enemies and rivals in craftiness.

Nauplios and Palamedes are not mentioned in the *Iliad* and the *Odyssey,* but their names appear in the cyclic poems. Nauplios is mentioned in the *Nosti*[29] and Palamedes in the *Cypria*[30] where, while fishing, he is slain by Odysseos. Since mythology describes Nauplios as a cause of mischief to the Greeks returning from Troy,[31] it may be that in the cyclic poems, Nauplios' wrath for the death of his son Palamedes takes the place of Poseidon's wrath for the blinding of his son Polyphemos in the Odyssey.

The name of Palamedes appears again in the generation of Aeschylos, Pindar, and Stesichoros.[32] By this time he had acquired the character of

25. Cf. Erwin Rohde, *Psyche; The Cult of Souls and Belief in Immortality among the Greeks,* translated from the German (London, 1925), 187 n. 25.

26. This is the most important source of the Argolid plain; Meliarakes, *loc. cit.*

27. Edition of Nürnberg, 1687, 13; edition of Venice, 1687, 122.

28. Doro Levi, "Stimfalo," *EI,* XXXII, 740.

29. fr. 1, Allen.

30. fr. 21, Allen.

31. Wagner, "Nauplios," Roscher, III, 27.

32. Stesichoros, fr. 34 Bergk, vol. IV, ascribes to Palamedes the invention of στοιχεῖα.

master of any subject with the concept of ἀριθμός. Since a poet Kerkops wrote about Palamedes[33] and we know of a Pythagorean poet named Kerkops of the sixth century, who wrote about the theory of numbers,[34] the two are like to be one and the same person who transformed Palamedes into an arithmetician.

This means that, before the end of the sixth century, the invention of μέτρα καὶ σταθμά had been ascribed to Palamedes. Since in this specific phrase μέτρα means the relation between the iron drachma and the silver mina, but in general μέτρα means a ratio and is synonymous with ἀριθμός, somebody assumed that he was the inventor of μέτρα in the sense of ἀριθμός. Hence, he became the inventor of ἀριθμός and of a number of concepts and devices connected with it.

Palamedes is the hero of many tragedies in which the dramatic element is provided by the fact that his own ingenuity is the cause of his undoing, as in the case of Prometheos. Each of the three great tragic writers dedicated to Palamedes a trilogy which consists of the tragedies *Ulixes furens*, *Palamedes* and *Nauplius*.[35] We have fragments of *Ulixes furens* and *Palamedes* of Aischylos and know of his Nauplius; we have fragments of *Ulixes furens* and *Palamedes* by Sophocles and of *Palamedes* by Euripides. The plot of the trilogy can be derived from Hyginus' *Fabulae*. In *Ulixes furens*, Palamedes exposes Odysseos by simulating insanity to avoid going to the Trojan War and by so doing gains for himself the mortal hatred of the latter.[36] In the tragedy Palamedes, the climactic one, Odysseos conceals a magnum pondum auri under Palamedes' tent and the accuses him of having been bought by Priam of Troy; as a result, Palamedes is stoned to death by the Greek army.[37]

33. Apollodoros II. I 5.

34. Kroll, "Kerkops," *RE,* XXI, 314; Rohde, *op. cit.,* 597.

35. Cf. Wilhelm Schmidt, *Geschichte der griechischen Literatur,* Handbuch des Altertums-wissenschaft VII, I (München, 1934), II, 44.

36. *Fabula* XCV.

37. *Fabula* CV.

In Nauplius, Palamedes' father, in order to avenge his son, uses false signaling fires to wreck the Greek fleet returning from Troy.[38]

From the surviving fragments of the tragedies, it appears that Palamedes is considered the inventor of *μέτρα καὶ σταθμά* and of many other things. The most complete list of these inventions can be gathered from two rhetorical exercises based on the subject of the tragedies: Ὑπὲρ Παλαμήδου ἀπολογία of Gorgias and *Odysseus*, ascribed by the manuscripts to Alkidamas. According to Gorgias,[39] Palamedes was the inventor of *τάξεις πολεμικὰς, νόμους γραπτοὺς, γράμματα, μέτρα καὶ σταθμὰ, ἀριθμὸν, πυρσοὺς, πεσσούς*; Alkidamas'[40] list is almost identical: *τάξεις πολεμικὰς, γράμματα, ἀριθμοὺς, μέτρα, σταθμοὺς, πεττοὺς, κύβους, μουσικὴν, νόμισμα, πυρσούς.*

The very subject of the tragedies shows that the invention of *μέτρα καὶ σταθμά* is the basic one; by a peculair tragic justice, the catastrophe of Palamedes is caused by the very thing to which he has applied his wits, the *magnum pondum auri.* Alkidamas,[41] who tries to belittle Palamedes, gives him credit only for the discovery of *μέτρα καὶ σταθμά*, besides the minor discoveries of the game of *κύβοι* and of *πεττοί*. Plato remarks that the tragic writers have extended the list of Palamedes' inventions to a ridiculous point (*παγγέλοιον*); in particular, Plato[42] denies him the invention of *ἀριθμός* and of *τάξεις πολεμικαί.* Sophocles still connects the invention of *ἀριθμός* with that of the *μέτρα καὶ σταθμά*:

Nauplius fr. 399, 2 Nauck²
σταθμῶν καὶ ἀριθμῶν καὶ μέτρων εὑρήματα

Also Gorgias[43] by the phrase *ἀριθμόν τε χρημάτων φύλακα* reveals that he thinks of the invention of *ἀριθμός* mainly as applying to monetary relations.

38. Fabula CXVI.
39. 31.
40. 22.
41. 27.
42. *De rei publicae* VII 522 d.
43. 30.

Once the invention of ἀριθμός was ascribed to Palamedes, the inventions of μουσική and of τάξεις πολεμικαί, which are connected with the concept of number, were attached to his name. Sophocles[44] ascribes to Palamedes also a group of discoveries in the field of astronomy, but the very words used (ἄστων μέτρα) prove that this, too, is an extension of the original invention of μέτρα.

The invention of κύβοι and of πεσσοί, too, is connected with the invention of μέτρα καὶ σταθμά. The κύβοι are the gaming dice, and the πεσσοί, a board game in which the men are moved by the throw of dice, as in backgammon. The gaming dice were originally the ankle bones of the hind legs of a sheep; this bone (*talus, os tarsi tibiale*) could be called in Greek ἀστράγαλος, κύβος, or σφυρόν. Because of its peculiar shape it had struck the imagination of the peoples of the Ancient World even in prehistoric times. Its shape may be schematically described as a cylindroid, that is, a cylinder in which the two parallel faces are elliptic instead of circular; it has, therefore, two flat surfaces at top and bottom and a rounded surface on the sides.

A large number of games were played with the help of this bone,[45] but the ways in which the bone could be used may be reduced to three. The bone may be caused to roll on its lateral surface;[46] in such a case it is used like a ball and called σφυρόν, from which comes the name σφαῖρα for that ball game and the playing ball.[47] It may be used as gaming dice with four throws, which consist of the top and bottom surfaces and of two sides of the lateral curved surface; in such a case it is generally called ἀστράγαλος. If the two short sides of the lateral surface are sawed off, there remain dice with six throws, like our own; in such a case the

44. Fr. 399 Nauck, vol. II.

45. Cf. Bice Boralevi Mancinelli, "Astragalo," *EI,* V. 86.

46. These are the games in which the bone may be substituted by a nut; cf. George Lafaye, "Talus," *DS,* V, 28.

47. Cf. Boisaoq, *op. cit.*, s.v. *σφαῖρα, σφυρόν.*

bone is more usually called κύβος. The use of dice in couples is due to the fact that each sheep has two such bones. The bone was often replaced with imitations made of metal, stone, ivory and glass; these objects are usually classified by archaeologists as "artificial astragali."

The important point for the present research is that one of the more common shapes of a reference weight in Greece is that of a sheep's ankle bone.[48] This is attested not only by the many specimens actually found, but also by the mention of weights of such space in inscriptions.[49] These weights can be of any size; in addition to those listed by Pernice, a bronze ankle bone weighing 93 kg. was found in the temple of Apollo Didymaios at Miletos.[50] Pernice[51] lists also a series of Athenian lead weights which bear the impression of an ankle bone. The same bone is also a common device on coins issued all over the Greek world from Cyprus to Sicily;[52] it appears among other devices on the Athenian *Wappenmünzen.*

Immediately after having stated that the Lydians invented coinage, Herodotos[53] adds that they were supposed to have invented the games of κύβοι, ἀστράγαλοι and σφαῖρα. Athough even Athenaios[54] made the objection to Herodotos that such games were known in Homer's time, there remains the fact that the introduction of coinage and the ankle bone were associated in the mind of the Greeks. According to Herodotos,[55] the Lydians discovered the ankle bone games to avert a famine, and in Sophocles[56] it is Palamedes who invents πεσσούς κύβους τε for the same reason.

48. Erich Pernice, *Griechische Gewichte* (Berlin, 1894), 7.

49. *Loc. cit.*

50. B. Hassoulier, "Offrande à Apollon Didyméen," *Mémoire de la Délegation en Perse,* VII (1905), 135.

51. *Op. cit.,* 16, 83.

52. Pernice, *op. cit.,* 16, n. 2; Head, *op. cit.,* 144, 740; Seltman, *Athens,* 26.

53. I 94.

54. I 19 a.

55. *Loc. cit.*

56. *Palamedes* f. 438 Nauck, vol. II.

In conclusion, there can be no doubt that the ankles bones of sheep had something to do with units of weight, and that the invention of *κύβοι* and of *πεσσοί* is ascribed to Palamedes is an expansion of the invention of *μέτρα καὶ σταθμά*.

The invention of *πυρσοί* is ascribed to Palamedes simply because his father tries to wreck the Greek fleet by misleading signaling fires.

To Palamedes was also ascribed the invention of letters *γράμματα, στοιχεῖα*. This invention, too, represents and expansion of that of *ἀριθμός*, although this may not seem so obvious to those uninitiated in a certain less familiar type of Greek thought. The rational number (*μέτρα, ἀριθμός*) was called *λόγος* and conceived as something pronounceable (*ῥητός*) and as such associated with the letters of the alphabet.[57] This may be the starting point of the Pythagorean doctrine that numbers are the roots (*στοιχεῖα*) of the universe. Unluckily we know very little about Pythagorean speculations, although they represent an influential undercurrent of Greek thinking. The only hint of the sort of reasoning that was followed on this subject is given by Plato's Theaetetus, where Socrates' interlocutor is Thaietetos, the master of the theory of irrational numbers (*τὸ ἄλογον*). In this dialogue, numbers and letters are considered as one entity in relation to the problem of *λόγος* and *τὸ ἄλογον*. For instance, to explain the concept of irrational number, the concept of *γράμματα* is divided (202 b) into that of *στοιχεῖα* and that of *συλλαβαί* and then it is stated:

57. Scholars of Greek mathematics deliberately avoid dealing with the relation which, for the Greeks, existed between letters and numbers. Apparently, they have assumed that it would be a confusing element; but by so doing they have missed the key to the understanding of the mathematical concept of *λόγος*. The terminology *ῥητά* and *ἄλογα* applied to rational and irrational quantities was used by the Pythagorean school, Schol. X 1 *ad Euclidis elementa*, Heiberg: *τὸ μὲν σύμμετρον φύσει ἂν εἴν ατοῖς, καὶ τὸ ἀσύμμετρον, τὸ δὲ ῥετὸν καὶ ἄλογον θέσει*. Even Franz Dornseiff, *Das Alphabet in Mystik und Magie* (Leipzig, 1925), vol. II, 11, glosses over the relation between letters and numbers.

203 a
ἆρ' αἱ μὲν συλλαβαὶ λόγον ἔχουσι, τὰ δὲ στοιχεῖα ἄλογα

In the same spirit, the ἀριθμητικός is considered (199 a) one with the γραμματτικός as the man to whom it is given πάντα μὲν γράμματα πάντα δὲ ἀριθμὸν ἐπίστασθαι.

According to the definition reported by Plato, the single στοιχεῖα are irrational (ἄλογος), whereas only the συλλαβαί are rational (λόγον ἔχειν), that is, are pronounceable. The λόγος is something which is achieved only by the organization of the στοιχεῖα. From this it follows that if, as I have assumed, Palamedes' invention of rational number (ἀριθμός) was extended to include letters (γράμματα), it must include only rational ones (συλλαβαί). And in fact Euripides states:

Palamedes fr. 578 Nauck, vol. II

ἄφωνα φωνήεντα συλλαβὰς τιθεὶς
εξῆυρον ἀνθρρώποισι γράμματ' εἰδέναι

This means that Palamedes brought rationality (λόγος) to the γράμματα by making them pronounceable.[58] Pindar, too, hints that logos is the particular field of endeavor of Palamedes:

58. Connected with the assimilation of letters and numbers is the doctrine that the world was created from the στοιχεῖα τοῦ κόσμου, consisting of the letters of the alphabet and the ten numbers. The context suggests that Plato had this doctrine in mind when he mentions (Theaetetus 201 e) στοιχεῖα, ἐξ ὧν ἡμεῖς τε συγκείμεθα καὶ τἆλλα. Nevertheless, the first outspoken mention of this doctrine is to be found in the Hebrew mystical writing Sefer Jesirah (Book of Creation), which was compiled at the earliest in the third century A.D. According to this book (I 1, 2 Goldschmidt) the world was created from the twenty-two letters of the Hebrew alphabet and the ten numbers; the numbers are described as גלימה, a word of disputed meaning which may be possibly explained as a rendering of ἄλογος. In the same passage there is also mention of the creation of the world by virtue of three ספל which, if they are correctly vocalized, correspond to the Greek terms γράμματα, ἀριθμοί, λόγος. In the apocryphal *Testamentum Salomonis,* the στοιχεῖα τοῦ κόσμοκράτορος τοῦ σκότους are said to be thirty-six (XVIII 2 MCown). This indicates that the doctrine is at least as old as the age in which there was used in Greece an alphabet of twenty-three letters, such as the Attic alphabet of the fifth century B.C.

ὄντα μὲν αὐτὸν κυριώτερον τοῦ Ὀδυσσέως εἰς σοφίας λόγον, ὡς ἔφη Πίνδαρος.[59]

Incidentally, all this implies that the speculation on the concept of irrational number is much older than Thaietetos and Eudoxos,[60] and that it was so well established before the end of the sixth century that somebody could reinterpret the myth of Palamedes in the light of it.[61]

The original invention of μέτρα καὶ σταθμά was ascribed to Palamedes because his mythological figure is closely associated with wealth. *Dictys Cretensis*[62] reports a version of the legend of Palamedes which must be as old as the *Cypria*; Palamedes is the victim of a plot of Diomedes and Odysseos who, by the promise of letting him share in a treasure, convince him to go down into a well, where they crush him with rocks. In the tragedies, too, it is buried *magnum pondum auri* that is the cause of his undoing.

The cult of Hera of the Heraion was closely connected with the eschatological mysteries of Lerna. Hera went every year to Nauplia (Napoli Vecchio) to bathe in a spring to recover her maidenhood.[63] Hera was worshiped at the Heraion not only as Euboia, but also as Prosymna;[64] Prosymna is also the name of a Demeter of Lerna[65] and Prosymnos is the one who shows the way to the other world in the myth of Lerna.[66] As Hera was worshiped at the Heraion and also in Lerna,

59. Aristides, *Contra Platonem pro quattuorviris,* 260, Dindorf II 339.

60. This proves the case of Thomas L. Heath, *The Thirteenth Book of Euclid's Elements* (Cambridge, 1926), I, 351, against G. Junge, "Wann haben die Griechen das Irrational endeckt?," *Novae Symbolae Joachimicae* (Halle, 1907), 221.

61. The quote scholium *ad Euclides elementa* relates that the first Pythagorean who revealed the secret of the irrational number died in a shipwreck. Perhaps the detail of the shipwreck has something to do with the myth of Palamedes.

62. II 15.

63. Pausanias II, XXXVIII 2.

64. "Prosymna," Roscher, III, 3154.

65. Pausanias II, XXXVII 1, XXXVI 7.

66. "Polymnos," Roscher, III 2567.

so Palamedes must have been worshiped in Lerna and at the Heraion too, because there is information to the effect that he was known as Εὐβοεύς.[67] Since Palamedes' cult is deeply rooted in Argive territory, the island of Euboia is altogether out of the question. Εὐβοεύς is a reference to the location of the Heraion. This confirms the interpretation given to the adjective Εὐβοικός applied to weights.

67. Eudokia, *Violarium* DCCXLIV; Gregorius Nazianzus, Or. IV, *Contra Iulianum* I, 107

11. The Dedication of Delphoi

A bundle of ὀβελίσκοι similar to that found at the temple of Argive Hera was preserved in front of the temple of Apollo of Delphoi. This bundle was known as the offering of Rhodopis (Ῥοδώριδος ἀνάθῆμα)[1] and was famous throughout the Greek world.[2] In Herodotos' time, the roasting spits could be seen tightly tied up together (συννενέαται) behind the altar of the Chians, in front of the very temple.[3] Plutarch,[4] on the contrary, states that they were no longer to be seen in his own time, but that the guide pointed out the place where they used to be.

These roasting spits were supposed to be the offering of the courtesan (ἑταίρα) Rhodopis who had attained astronomical wealth by her profession. Herdotos[5] reports that she was a Thracian slave who, after various adventures in which the mythical poet Aesop was involved, landed in Naukratis in Egypt to ply her trade; there, after she was freed by Sappho's brother Chraxos, she accumulated her fortune. Finally, desiring to send to Delphoi an offering so unusual that her name would not be forgotten, she spent a tenth of her estate to have a number of roasting spits manufactured and dedicated them to Apollo at Delphoi.

1. Suidas s.v. Ῥοδώριδος ἀνάθῆμα.
2. Athenaios, XIII 596 c, calls them περιβοήτους ὀβελίσκους.
3. Herodotos II 135.
4. *De Pythiae orac.* 400 d.
5. II 134-135.

Herodotos reports also that she was believed to have built the Third Pyramid of Gizeh,[6] but he rejects this part of the story because he knows that this pyramid was the world of Mykerinos (Fourth Dynasty), whereas he thinks that Rhodopis lived at the time of Amasis. He further remarks that this Rhodopis' wealth must have been small indeed if the tithe of her fortune was a bundle of roasting spits. Although by the statement that Rhodopis had ὀβελίσκοι made in order to send something unusual, Herodotos reveals that he does not know that they used to circulate as money, his remark is sound and I shall take my start from it in analyzing this tale.

Since the 180 ὀβελίσκοι of the Heraion had the values of half a mina and Plutarch[7] stats that ten minae of iron money would fill a large storage room, the ὀβελίσκοι of Rhodopis[8] must not have been preserved in a choice place of the sanctuary of Delphoi because of their value. The area of the sanctuary was extremely crowded and the worthless offering of a little strumpet would not have gotten the honor of being placed in front of the temple itself near the main altar.[9] Hence, it follows that the ὀβελίσκοι were set up for a reason similar to that for which a like bundle was set up in front of the temple of Argive Hera, that is establish a standard of currency. As the ὀβελίσκοι of the Heraion were transferred to the platform of the new temple after the old one burned in 423 B.C., so those of Delphoi were preserved in front of the new temple after fire

6. The construction of the Third Pyramid is ascribed to Rhodopis by Diodorus, I 64 and Pliny, XXXVI 82; Apellas of Pontos, quoted by Suidas, *loc. cit.,* ascribes to her the construction of a pyramid.

7. *Lycurgos* IX.

8. Suidas, *loc. cit.,* says ὀβελίσκοι ἐν Δελφῖς πολλοί, which suggests that their number may have been a few hundred at most.

9. For the Greeks, and not for the Greeks alone, prostitution was honorable or dishonorable in direct proportion to the compensaion received; cf. Andokides *De mysteriis* 100: ὃς ἑνὶ μὲν οὐχ ἡταίρησας (καλῶς γὰρ ἄν σοι εἶχε), πραττόμενος δ' οὐ πολὺ ἀργύριον τὸν βουλόμενον ἀνθρώπων.

destroyed the old temple of Apollo in 548 B.C. Although at the time of Herodotus it had even been forgotten that in former times they had been used as money, there remained the tradition that they were objects of great economic importance.

Herodotos refutes the belief that the Rhodopis of the roasting spits of Delphoi had built the third Pyramid, but this belief reflects an egyptian tradition of long standing, according to which this pyramid had been built by a woman. Egyptologists have noticed taht a passage of Manetho[10] reveals the Rhodopis ("Redcheek") is another name for Queen Nitokris. Manetho makes this Nitokris-Rhodopis a queen of the Sixth Dynasty, but it has been demonstrated that this is due to a speculation of his, made for the purpose of rationalizing the legend that she had built a pyramid.[11] Ailianos[12] and Strabo[13] report that the courtesan Rhodopis married king Psammetichos of Egypt. This information makes clear that the Nitokris-Rhodopis in question is the daughter of King Psammetichos I. This Nitokris played a great part in the history of the Saïte Twenty-sixth Dyansty, because her father had her adopted by the Divine Votaress of Ammon, so as to legitimize his newly acquired rule.[14] Later Nitokris became Divine Votaress herself and adopted, in turn, the daughter of Psammetichos II and, thereby, entered into a relation of quasi-marriage with him.

Between the Divine Votaress of Ammon and teh king of Egypt there was a relation similar to marriage; occasionally she is referred to

10. Fr. 20 Waddell: Νίτωκρις ... ξανθὴ τὴν χροιὰν ἣ τρίτηνἤγειρε πυραμίδα; fr. 21: *flava rubris genis.*

11. Harry Reginald Hall, "Nitokris-Rhodopis, *JHS,* XXIV (1904), 208; B. Van De Valle, "La Quatrième pyramide de Gizeh et la légende de Rhodopis," *Antiquité Classique,* III (1934) 309.

12. *Var. hist.* XIII 33.

13. XVII 808.

14. Hall, *Cambridge Ancient History,* III, 307.

as a legitimate wife, but more commonly by the Egyptian word *ḥm.t ntr,* "Divine Consort," a word which Diodoros renders by παλλακὶς Διός. According to the custom of oriental rulers of having secondary wives, this marriage did not prevent the king from having a legitimate wife and, possibly, other wives. A wife who is not the legitimate one would be called by the Greeks ἑταίρα; hence, because of the wide latitude of meaning of this word, the daughter of Psammetichos I, mystical wife of Psammetichos II, and Divine Votaress of Ammon, because the cheap harlot *Rhodopis meretricula* of Pliny.[15]

Once the Rhodopis of the iron spits of Delphoi and of the Third Pyramid was understood to be a courtesan, she was identified with a famous dancer Rhodopis of Thrace,[16] and with the Doricha of Naukratis for whom Sappho's brother ruined himself.[17] From these elements is concocted the tale reported by Herodotos.

In classical times, not even the highest priests of Apollo knew who had really been the ἑταίρα Rhodopis, since the illustrious fourth century courtesan Phryne of Thespiai, the one defended by Hypereides, could use the relique of Rhodopis as a precedent establishing her right to set up a golden statue of herself near it, that is, in the best spot in Delphoi.[18] This statue was the work of her friend Praxiteles.

A similar misunderstanding of the meaning of ἑταίρα takes place in relation to Psammetichos I's contemporary and ally, Gyges of Lydia. The Greek reports on the manner in which Gyges supplanted his master Kanduales rationalize things by assuming a love affair bytween Gyges and Kandaules' wife whom he married he married after her husband

15. XXXVI 82.

16. Mentioned by Lukilios *De Saltatione* 51.

17. Strabo, XVII 808, states that the Rhodopis who built the Third Pyramid is the Doricha mentioned by Sappho; Athenaios, XIII 596 C, remarks that Herdotos is wrong in identifying Doricha with the Rhodopis of the ὀβελίσκοι of Delphoi.

18. Friedrich Schober, "Delphoi," *RE,* Suppl. V, 87.

was dispatched. In the version of Nikolaos of Damaskos,[19] derived from the Hellenized Lydian historian Xanthos,[20] Gyges falls in love with Kandaules' wife, but she does not respond to him and tries to crush the plot against her husband; in the version of Xanthos' imitator Herodotos,[21] Kandaules is the victim of a plot hatched by his unfaithful wife and Gyges. According to Heinrich Gelzer,[22] the marriage between Gyges and Kandaules' widow is just one of the many examples of oriental rulers legalizing their power by taking the widow or daughter of their predecessor as a wife or a mystical wife (*Götterweib*). Because the Greeks did not understand this institution, as is proved by their outcry against Alexander the Great's marriage to Darios' daughter, the Greek historian Herodotos and the Hellenized historian Xanthos reported nationalized versions in which the marriage between Gyges and the widow of the man he had assassinated is explained by a previous love affair.

Klearchos of Soloi[23] reports that Gyges' loved one (ἐρωμένη) completely dominated him and his kingdom, and that after her death he built her a huge monument known as τῆς ἑταίρας μνῆμα. This passage proves that the mystical wife was known to the Greeks as ἑταίρα and that they misunderstood the nature of this institution. The same misunderstanding takes place in relation to the tomb of king Alyattes, the third successor of Gyges, which Strabo[24] reports was known as πόρνης μνῆμα and which Herodotos[25] claims was built by the work of prostitutes.

19. Fr. 47 Jacoby.

20. Georges Radet, *La Lydie et le monde grec au temps de Mermnades* (687-546) (Paris, 1893), 112; Felix Jacoby, *Die Fragmente der griechischen Historiker* (Berlin, 1923), II C, 233, 246.

21. I 8-12; also according to Plato, De rep., II 360 a, Kandaules is the victim of a plat between his wife and her paramour Gyges.

22. "Das Zeitalter der Gyges," *Rheinisches Museum,* XXXV (1880), 516; cf. Radet, *op. cit.,* 122.

23. Fr. 34 FHG.

24. XIII 627.

25. I 93; cf. Ailianos *Var. hist.* IV 1.

The versions of Gyges' relation with the wife of his predecessor, reported by Xanthos, Herodotos, and Klearchos, prove that the Greeks could not conceive of a relation outside legitimate marriage which is not an irregular love affair,[26] whereas the political marriage may be just the opposite of a sex relation. The fact of a marriage without sex is probably the origin of the story, reported by Xanthos, that Gyges was the first to find a way to castrate (sic: *εὐνουχίζω*) women.

Dynastic institutions were repugnant to the Greek society, as it developed from the sixth century on, and, therefore, a marriage which is pure formality for political reasons cannot be conceived. Herodotos[27] relates that Amasis of Egypt, having entered into a treaty of friendship with Cyrene, married a daughter of the king Battos of Cyrene, and wonders whether he did so because he craved a Greek wife or (*καὶ ἄλλως*) because he wanted to be friendly to the Cyreneans; but the idea that it could have been the second reason alone does not occur to him. Herodotos also reports that a charm prevented Amasis from having intercourse with his Greek wife, whereas this was possible with his other wives, and that the Greek wife finally broke the spell with the help of Aphrodite. This tale proves that a political marriage without sex was a disturbing idea to the Greeks of the classical age[28] who tried variously to rationalize reports of such an institution. Perhaps the story that the grandee Megakles turned against the tyrant Peisistratos because the latter refused to have a sex relation[29], or a normal sex relation[30] with

26. Demosthenes, *In Neaeram* 122: *τὰς μὲν γὰρ ἑταίρας ἡδονῆς ἕνεκ' ἔχομεν, τὰς δὲ παλλακὰς τῆς καθ' ἡμέραν θεραπείας τοῦ σώματος, τὰς δὲ γυναῖκας τοῦ παιδοποιεῖσθαι γνησίως καὶ τῶν ἔνδον φύλακα πιστὴν ἔχειν.*

27. II 181.

28. Greek writers agree that the purpose of marriage is the generation of legitimate children; the formula of marriage is preserved by Menandros, *Perikeiromene* 894 Allison: *ταύτην γνησων παίδων ἐπ' ἀρότῳ σοι δίδωμι.*

29. Aristotle, *Resp. Athen.* XV.

30. Herodotus I 61.

Megakles' daughter whom he had married for political reasons, is also due to a misunderstanding of the nature of a political marriage.

In conclusion, there can be no doubt that the person who had the ὀβελίσκοι set up in Delphoi was Nitokris, spiritual ruler of Egypt. This allows us to determine the date of their dedication; they must have been dedicated in a period in which Nitokris was ἑταίρα of the king of Egypt. From epigraphical evidence we know that Nitokris was adopted by the Divine Votaress in 654 B.C.,[31] became Divine Votaress herself around 640 B.C.[32] and died in 584 B.C.[33] We know also that she adopted the daughter of King Psammetichos II in 593 B.C. and thereby entered into a relation of quasi-marriage with him. Inscriptions mention her as Divine Consort during the reign of Psammetichos I (644-610 B.C.)[34] but not during that of his successor Neko (610-594 B.C.).[35] Since the Greeks would hardly have construed the relation between Psammetichos I and his daughter as a marriage, it seems that the Psammetichos described as husband of Rhodopis must be the second one. Therefore, the dedication of the bundle of ὀβελίσκοι in Delphoi should be dated in the period 593-584 B.C. If this date is the correct one, it is highly significant, because it coincides with the date of the monetary reforms of Solon, when Athens abandoned the use of the drachma calculated on the basis of the φειδώνεια μέτρα and substituted for it a drachma calculated on decimal μέτρα, in which the mina is divided into 50 didrachma corresponding to the Egyptian *kedet*.

Incidentally, the severance of the elements composing Herodotos' tale of Rhodopis may help in solving the problem of the date of the foundation of Naukratis as a Greek city. The problem hinges on knowing

31. James Henry Breasted, *Ancient Records of Egypt* (Chicago, 1906), IV, 938 ss.

32. *Op. cit.,* 958 ss.

33. *Loc. cit.*

34. *Op. cit.,* 958.

35. W. M. Flinders Petrie, *A History of Egypt* (London, 1905), III, 357.

when Herodotos thought Naukratis had been founded, although there always remains the possibility that he might have been wrong. The bone of contention is the interpretation of Herodotos'[36] statement that Amasis ἔδωκεν Ναύκρατιν πόλιν ἐνοικῆσαιτο to the Greeks; according to some scholars this means that Naukratis became a Greek city under Amasis, whereas others defend the less obvious interpretation that Amasis restricted the Greeks to Naukratis.[37] Having identified Rhodopis with the Doricha of Naurkatis who was the lover of Sappho's brother, Herodotos states that she lived at the time of Amasis. He may have reached this conclusion because he thought that Rhodopis-Doricha could not have lived before the foundation of Naukratis; if this is true, then the first interpretation of the above quoted sentence of Herodotos is substantiated. Or, he may have dated Rhodopis-Doricha from what he know about the life of Sappho.[38] In either case the conclusion is that in Herodotos' chronology the trip of Sappho's brother to Naukratis was dated in teh reign of Amasis (570-526 B.C.)

In consideration of the fact that the legend that Rhodopis built the Third Pyramid is less incongruous than has been thought up to now, one should reconsider the possibility that this pyramid underwent repairs at the time of the Saïte Restoration, which is characterized by an antiquarian interest in the art of the pyramid dynasties.[39]

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36. II.178.

37. Cf. Walther Wybergh, W. W. How, *Commentary on Herodotus* (Oxford, 1928), I 253.

38. We have no fragment of Sappho with the name of Doricha. The sources attesting that Doricha was mentioned by Sappho are examined by Ulrich von Wilamowitz-Moellendorf, *Sappho und Simnoides* (Berlin, 1913), 19 n.1.

39. Ludwig Borchardt, *Zeitschrift ür ägyptische Sprache,* XXX (1892), 92 maintains on the basis of archaeological evidence that the Third Pyramid was extensively restored under the Twenty-sixth Dynasty; Hall, *JHS,* XXIV (1904), 213 n.1, rejects Borchardt's theory for lack of historical evidence.

12 The Balance of Perachora

A fragment of an inscription discovered by Humfry Payne[1] in the temple of Hera Limnia at Perachora may be a monument of the period in which iron money was still used in the district of Corinth, but was measured according to weight.

In the center of this temple, four blocks of stone formed a pit-altar (ἐσχάρα). One of the blocks was a gray-green schist, whereas the other three were of limestone and had been made of the stones of three disused inscriptions. The block which is of interest to us had been shaped by utilizing somewhat more than one-fourth of a rectangular slab, of the approximate length of 130 cm. and width of 25 cm.;[2] the editor of the inscription, Henry Theodore Wade-Gery,[3] does not give any data about the thickness, but from what one can judge from photographs it was about one foot. The upper right quarter of this slab which is preserved to us used to bear the first half of two lines of sinistrorse inscriptions; but only the first half of the first line is legible, whereas the first of the second line has been completely worn out with the exception of the first

1. *Perachora: The sanctuaries of Hera Akraia and Limenia,* vol. I (1940), 111

2. These figures are derived from the drawing of *Perachora,* plate XCCII, which must have been on a scale of 1:5

3. *Op. cit.,* 257-261.

three letters. The following is what remains of the inscription,[4] written dextroreum:

ΔΡΑΧΜΑ ΕΓΟ ΗΕΡΑ ΛΕΥϘ
ΛΑΙ

The first line contains the first three feet of an hexameter, and this is the reason for believing that the letter koppa, which has been cut across in the shaping of the curbstone, used to be in the middle of the original inscription and of the original stone. Under the three letters of the second line, there is a deep hole which may have been a mortise for a tenon. Wade-Gery maintains that this hole was at the middle of the width of the stone, and that a similar hole was to be found in a symmetrical position in the missing left half of the original inscription stone. Most likely on the lower half of the stone, under the two mortise holes, there were two more lines of inscription.

Since the inscription begins with the words δράχμα ἐγώ, followed by the vocative of the Goddess Ἥρα λευκώλενε, Wade-Gery concludes that it deals with the dedication of a drachma. On the basis of the current interpretation of the dedication of the Argive Heraion, he argues that the stone used to be the support of a faggot of six iron ὀβελίσκοι similar to those of the Heraion, which were dedicated to Hera Limenia in order to "demonetize" all similar objects. In substance, it would be a repetition of what is believed to be the dedication of the Heraion. However, the very moment Wade-Gery accepts the current theory on the dedication of the Heraion, he casts a doubt on its key point: the assumption that the dedication of a sample of ὀβελίσκοι there could make all similar objects tabu throughout Greece. If the dedication had to be repeated elsewhere, it follows that it had fallen short of its purpose. Even accepting the current interpretation of the offering of the Argive Heraion, Wade-Gery's reconstruction presents a number of difficulties. He believes taht

4. Plate XI.

the two mortise holes were the socket of two metal stanchions which held a budnle of six ὀβελίσκοι smilar to those of the Heraion; but the holes wee much bigger than were needed to support a wight of ca. 2420 grams. He admits that, by considering the shape of the stone, one would conclude that it was a base with the inscribed side facing upwards; but since the drachma of ὀβελίσκοι would hardly have been placed horizontally almost at ground level, he propounds the theory that the stone was a stele in which the lines were read from bottom up.

It seems to me that any attempt at a reconstruction should start from the fact that the stone looks like a base.[5] If it was a based, then the two mortise holes had the purpose of holding two upright objects or two ends of an upright object. The nature of this object or objects may be determined with the help of the inscription.

The second line of the inscription begins with the letters λαι. Wade-Gery believes that they wee the end of a first declension now or adjective in the nominative plural or in the dative singular.[6] This is possible, but there is a greater chance that the second line did not begin at the middle of a word, particularly in view of the fact that the text was couched in hexameters. If the letters λαι are the beginning of a word, the alternatives are only a few, among which there are grounds for preferring the word λαία, "counterweight."

This word is used in various forms: singular, λεία and λέα; plural λαιαί, λεῖαι and λεαί. It is most commonly used to designate the weights which

5. Humfry Payne, *op. cit.,* 111, felt sure that the stone was once the base of a votive offering.

6. Wade-Gery proposes these two possible restorations:

δραχμα εγω hερα λευφ[ολενε κειμαι εν' αυ]
λαι

or

δραχμα εγω hερα λευφ[ολενε νυν δε ται αλ]
λαι

hange from each of the warp threads of an upright loom to keep them taut. It is cognate with λᾶας, "pebble, pellet," λαϊγξ, "small stone," λεύω, "to lapidate"; the common root is λαϝ, λεϝ. According to Boissacq,[7] the parallel forms in other Indo-European languages }among which the English lead] reveal that even in the parent language a word meaning "weight of a plumb line" was derived from this root. The best information on the exact meaning of the word is afforded by Heron, who uses repeatedly to describe a counterpoise in various machines; he uses it for the weight which, by pulling a rope, causes a machine to move,[8] and for a weight sliding on the notched beam of a balance.[9]

If on the inscription there was the word λαία, it is likely that the stone was the base of a contrivance in which there was a counterpoise pulling a rope. Since the inscription begins with the words δράχμα ἐγώ, t follows that the counterpoise had the weight of a drachma and that the contrivance in question was a balance. In my opinion, it was a balance which one side had a pan for the iron money and on the other side a stone counterpoise of the weight of an iron drachma. A Roman scale to weigh coins, in which the counterpoise is substituted for one of the pans, is preserved in the Galleria degli Uffizi of Florence (Plate XII). The balance may have been supported by a wooden crossbar resting on two uprights fitted into the stone by tenons; a ceramic representation of Priam paying the ransom for Hector's body illustrates a similar support of a balance (Plate XIII). When neither the pan nor the counterpoise touched the stone, and the beam was parallel with the crossbar, the balance was in equilibrium.

If the stone was the base of a balance, the inscription may be restored in the following way:

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7. op. cit., s.v. λᾶας

8. *Automata* XVIII; fig 98 edition Schmidt.

9. *Pneumatica* II; figg. 71, 74.

δράχμα ἐγὸ hέρα λευρ[όλενε hέλκομαι Fίσα]
λαί[σαν ταύταν ...

"I drachma, O white-armed Hera, balance exactly this counterweight …" The money which is on the pan of the balance and is about to be dedicated to the Goddess addresses her and assures her that by accepting it she is not going to be shortchanged.

The word ἕλκομαι expresses the idea of pulling down a counterweight on a balance and, for this reason, it means also "to weigh," as shown by the following examples:

Herodotos I 50

λέοντος εἰκόνα χρυσοῦ ἀπέφθου ἕλκουσαν σταθμὸν τάλαντα δέκα

The lion in question was an offering at Delphoi.

idem II 65

ἱστᾶσι σταθμῷ πρὸς ἀργύριον τὰς τρίχας: τὸ δ' ἂν ἑλκύσῃ, τοῦτο τῇ μελεδωνῷ
τῶν θηρίων διδοῖ

The hair is balanced with silver, and the silver is dedicated for the upkeep of sacred animals in an Egyptian temple.

Eupolis fr. 116 Kock

τοιγαροῦν στρατηγὸς ἐξ ἐκείνου τοῦ χρόνου
οὐ δεὶς δύναται ὥσπερ μειαγωγὸς ἑστιῶν
τῆς τοῦδε νίκης πλείονα ἑλκύσαι σταθμόν

In order to express the idea that the glory of a victory reported by a certain general can be equalled but not surpassed, the playwright refers to the weighing of sacrificial animals to test whether they come up to the required standards. This implies that sacrificial animals were weighed against a fixed counterweight, so that any excess weight was not taken into account. The lamb which was offered at the festival of Apaturia for each new member registered in a *phratra* was weighed in such a manner:

Aristophanes fr. 286 Koch

ἀλλ' εὔχομαι ἔγωγε ἐλκύσαι σε τὸν σταθμὸν
ἵνα μή με προπράττωει γραῦν οἱ φράτορες

The following passage is my authority for assuming that in the inscription ἑλκομαι was accompanied by some term like ἴσα, expressing exactitude.

Plato Minos 316 a

πότερον δὲ τὰ πλεῖον ἕλκοντα βαρύτερα νομίζεται
ἐνθάδε, τὰ δὲ ἔλαττον κουφότερα, ἢ τοὐναντίον;

The second line of the inscription may have continued with some reference to the standard according to which the counterweight had been calculated, as for instance πρὸς σαθμόν followed by a genitive.

Possibly the balance was kept inside the temple alongside the wall, and, for this reason, once it became useless after iron currency was completely supplanted, its stone base was handy for the repair of the pit-altar.

If we know the date at which the inscription was cut, we would have a *terminus ante quem* for the age in which iron began to be measured by weight; if we knew the date at which teh base was used to make a curbsone, we should have a *terminus ante quem* for the age in which iron currency went completely out of use in the district of Corinth.

The style of lettering of the inscription is not very enlightening, at our present state of knowledge of Corinthian inscriptions; nevertheless, it is safe to exclude a date before 630 B.C. The lettering resembles that of Corinthian inscriptions dated in the sixth century; for instance, it calls to mind the inscription IG IX, 1 869 from Kerkyra. Since the inscription is sinistrorse, it cannot be dated later than the beginning of the sixth century. It contains the letter chi, which, according to Berthold Louis Ullman,[10] was adopted in the Corinthian region much later than the second half of the seventh century.

10. "The Added Letters of the Greek Alphabet," *Classical Philology,* XXII (1927), 141.

Payne has collected with great care all evidence which could be derived from potsherds found in or around the pit-altar. Under the uninscribed schist block there were found ashes and two middle or late Protocorinthian sherds, whereas under the three inscribed limestone blocks there were neither ashes nor sherds. Payne[11] concluded that the three limestone blocks were put into place when the temple was built, whereas the schist block was substituted at a later date for a curbsone which had been damaged by the fire of the altar. But, since the temple was built around 750 B.C.,[12] this hypothesis is unacceptable, because it would imply a date too early for the inscriptions. A different solution is hinted at by Payne himself, when he remarks incidentally that "the whole pit may have been cleaned when the blocks were put into position."[13] It might be that the pit was not cleaned when the schist block was put into position, but it was cleaned when the three limestone blocks were used for repair. Hence, the limestone blocks were used as curbstones after ashes and two sherds had found their way under the schist block; the sherds cannot be dated earlier than 675 B.C. If the pit was cleaned before setting the three limestone blocks, the earliest objects found in the pit provide a *terminus ante quem* for the date at which the balance went out of use. Payne relates that two or three sherds were found among the ashes of the pit and that "they appeared to be either Protocorinthian or archaic Corinthian, but were not distinctive or exactly datable."[14] Hence, even though a date preceding 620 B.C. is hinted at, a date down to the beginning of the sixth century is possible.

In conclusion, it is possible to surmise that the last three decades of the seventh century and the first two decades of the sixth cover roughly the transitional period in which, after the introduction of silver currency, iron continued to circulate, but was measured according to weight.

11. *Perachora,* 111.

12. *Op. cit.,* 112.

13. *Loc. cit.*

14. *Loc. cit.*

Addendum I:

Homeric Currency

1. Bronze Age Copper Ingots

In the society portrayed by Homer, iron[1] ὀβελίσκοι were commonly used for cooking meat, but do not seem to have been used as currency. Homer mentions instead another form of iron utensil money: double axes (πελέκεις).

A great deal has been written on the Homeric πελέκεις, but often with the result of piling one misconception upon another.

For a time the πελέκεις have been almost unanimously identified with Bronze Age copper ingots found in Crete, Cyprus, Greece proper, Asia Minor, Sicily, and Sardinia,[2] which were said to be Minoan double axes. On the basis of this identification, there have been developed theories on the Minoan system of units of weight and of value, on the spread of Minoan trade, and on the Homeric τάλαντον. Since the fancy of scholars has run wild about these copper ingots, it is necessary to list the facts soberly. Six of these ingots, found in six different localities,

1. Il. XXIII 30.

2. The most complete list is to be found in O. Davies, "The Copper Mines of Cyprus," BSA, XXX (1928-30), 78. To this list must be added a specimen in the Metropolitan Museum, which is said to be from Asia Minor (Richter, op. cit., no. 1810). I do not think Arthur Evans, "Minoan Weights and Currency," Corolla Numismatica (London, 1906), 360, was right in classifying among these ingots a small piece from Dalmatia weighing 108 grams and described as of "bronze."

have been analyzed and found to be of pure copper.[1] The weight of the ingots varies from a minimum of 5 kg. to a maximum of 37 kg.;[2] even specimens found in the same place are of different weights.[3] The most striking feature is that one side of the ingots is smooth, whereas the other side is roughened in into a cluster of rounding lumps. The shape is normally that of a rectangle with all four sides curved in; there are, however a few specimens with only two opposite sides curved in, and the other two sides straight. The curving of the sides is generally slight, but there are a number of pieces in which the two short sides are so sharply incurved as to form almost a semicircle.

It is in consideration of the last-mentioned pieces, and in consideration of the fact that all well preserved specimens have a smooth side and a rough side, that it has been argued by some that these ingots are not double axes, but imitation of animal hides. According to Robert Forrer[4] they embody a development from an earlier currency of animal skins; according to Seltman,[5] they are cast into the shape of ox-hides because the represent the value of an ox. These last two theories have the merit of rejecting the absurd classification of these ingots as Minoan double axes, but are even weaker from the logical point of view, because they continue to assume that these ingots are monetary units, even though this assumption is based on their identification with the Homeric πελέκεις.

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1. Davies, *op. cit.,* 70.

2. See table of weights in Svoronos, *op. cit.,* 171.

3. See weights of the specimens from Chalkis in Robert Forrer, "Die ägyptischen, kretischen, phönikischen etc. Gewichte und Masse der europäischen Kupfer,- Bronze- und Eisenzeit," *Jahrbuch der Gesellschaft für lothringische Geschichte und Altertumskunde,* XVIII (1908), 27.

4. *Op. cit.,* 24.

5. *Athens,* 4; this interpretation follows on the main that of Diedrich Fimmen, *Die kretisch-mykenische Kultur* (Berlin, 1921), 122. Cf. Nillson, *op. cit.,* 185.

The truth of the matter is that we are dealing with plain ingots of raw material, cast into the described shape for mere technological reasons. There is abundant archaeological evidence to prove this point. In the tomb of the Egyptian vizier Rekhmire (fifteenth century B.C.) are represented tributaries from Æthiopia, Syria, and the Islands, carrying metal ingots shaped like rectangles with concave sides;[1] these ingots are painted alternately plain and dotted, which indicates that they were smooth on one side and rough on the other. Other Egyptian paintings reveal that gold, silver, lead and copper were cast into the shape of a rectangle with incurved sides.[2] In the Roman Empire, in the fourth century A.D., in a period in which silver circulated as bullion, there were issued silver ingots of the same shape;[3] Oscar Montelius[4] claims that these too are double axes. The shape with the two short sides sharply curved in, which according to Forrer and Seltman proves that these ingots imitate animal hides, appears in a Cornish tin ingot dredged up off Falmouth,[5] which may be of classical or pre-classical age. The particular shape with rounded corners which is draw on on some tablets

1. Philippe Virey, "Tombeau de Rekhmara," *Mémoires publiés par les membres de la Mission archéologique française au Caire,* V (1894), 33; John Gardner Wilkinson, *Manners and Customs of the Ancient Egyptians* (London 1878), plate II.

2. Richard Lepsius, *Le Métaux dans les inscriptions égyptiennes* (Paris, 1877), 58, plate I.

3. Heinrich Willers, "Römische Silberbarren aus dem Britischen Museum," *Numismatische Zeitschrift,* XXXI (1899), 367; idem, *Die römischen Bronzeeimer von Hemmoor* (Hannover, 1901), 223; Arthur Evans, "Coinage and Currency in Roman Britain," *NC,* XV (1915), 512; Henry Beauchamp Walters, *Catalogue of Silver Plate (Greek, Etruscan and Roman) in the British Museum* (London, 1921), nos. 118, 195, 196, 197.

4. "Die Chronologie der Älteren Bronzezeit in Nord Deutschland und Skandinavien," *Zeitschrift für Anthropologie* XXV (1898), 461 n. 4.

5. Henry James, *Note on the Block of Tin Dredged Up in Falmouth Harbour* (London, 1863); H. O'Neill Hencken, *The Archaeology of Cornwall and Scilly* (London, 1932), 166

from Knossos[1] reappears in a stone mold found in the gold mines of the Zimbabwe culture of Southern Rhodesia, a culture tentatively dated in the fourteenth century A.D.[2] This stone mold for gold proves that the ingots portrayed on the Cretan tables are not necessarily of copper as is believed.

The reason for casting metals into molds with concave sides is to achieve a more even rate of cooling through the mass, so as to avoid flaws in teh ingots, and in particular, cracks along the edges; even in the metallurgy of today similar molds, known as "fluted molds" are used to this effect. The presence of a smooth and of a right side in the ingots may be ascribed to the use of mold-dressing, such as is used today to prevent the adhesion of the copper to the mold. The smooth side is the free upper surface, as indicated also by the section of the ingots. Having had the opportunity to examine only one of the ingots, I cannot offer any hypothesis as to what might have been the mold-dressing used. It is possible that the mold was not of solid material, but was shaped in some loose material which later could be washed away.

In conclusion, the copper ingots have nothing to do either with Minoan double axes or with Homeric πελέκεις and do not present any feature that may indicate that they were used as a unit of value.

The identification of these copper ingots with Minoan double axes and with Homeric πελέκεις has caused scholars to describe as Cretan imports a number of Chalcolithic Age copper double axes found in Germany, Switzerland and France.[3] These axes must have been used

1. Evans, *op. cit.,* 361.

2. James Theodore Bent, *The Ruined Cities of Mashonaland* (London, 1892), 184.

3. Abraham Lissauer, "Die Doppeläxte der Kupferzeit im westlichen Europa," *Zeitschrift für Ethnologie,* XXXV (1905), 523; idem, *Congrès International d'Archéologie, Athènes 1905, Comptes rendus* 203; Montelius, *op. cit.,* 461; Déchelette, *Manuel d'Arcgéologie préhistorique et gallo-romaine* (Paris, 1914), II, 403.

as currency because the hole for the helve is too narrow to allow their use as tools; most likely the hole was used only to pass through a rope for carrying. Whereas the axes do not resemble any one found in the Aegean area, they are identical with usable ones found in the same central-western European region.[1] Hence, although these axes do not document any direct link between the cultures of the two areas, the represent a native form of utensil-money which has its parallel in the of the Homeric culture.

1. Charles F. C. Hawkes, "The Double Axe in Prehistoric Europe," *BSA* XXXVII (1936-37), 141.

2. Utensil-Money of Double Axes

The most significant datum about the Homeric πελέκεις is that those used as currency are of iron, whereas those used as tools apparently are only of bronze. This could be explained by the hypothesis that the only iron known at that time was cast iron, so that it could serve for the manufacture of axes used as currency, but not for axes used as tools. In the *Iliad*,[1] the first prize in an archery contest consists of twelve iron πελέκεις and the second prize of twelve iron ἡμιπέλεκκα; but a πέλεκυς used for chopping is of bronze.[2] Iron are mentioned another time in the Homeric poems: in the Odyssey, twelve double axes of iron are stuck into the ground in a row, so that the helve-holes form a sort of tunnel though which the Suitors are asked to shoot an arrow.[3] Since Penelope states that Odysseos used to practice archery in such a way,[4] it is implied that a number of double axes without helves were readily available in his house. Axes without helves would be kept in the house by the dozen to be used as currency, rather than to be used as tools.[5]

1. XXIII 851.

2. *Od.* V 245.

3. XXI, 114; XIX, 587.

4. XXI, 75; XIX, 571.

5. XXI 420 ss. My interpretation of this passage is different from various ones

Unluckily, we lack archaeological evidence on the πελέκεις, such as could be provided by the discovery of a hoard of double axes. At the present time, I can only mention an iron double ax found in a Geometric tholos at Agiou Georgiou Papoura in Crete.[1] A Protogeometric iron ax was found at Vrokastro, but this specimen was perished and the description does not even tell whether it was a single or a double ax.[2]

There is some archaeological evidence that may help in explaining what Homer meant by ἡμιπέλεκκα. Up to now scholars had accepted the none too satisfactory explanation of ancient grammarians according to which they were single-bitted axes; but recently a new interpretation has been offered by H. R .M. Leopold.[3] In classifying by types the hundreds of bronze objects found in the Bronze Age hoard of Piediluco, Umbria, he noticed that the axes could be divided into two types: the axes with an eye for the helve were fit for use and had been sharpened, whereas those of the older winged type, in which the celt is stuck into the helve, had never been fit for use, as shown by the fact that the wings had been cast incomplete. This seems to indicate that the winged clets, a type by then obsolete, were used only as utensil-money. Since a number of these winged celts had been deliberately broken at the middle, so as to separate the head from the blade, Leopold suggests that the broken halves correspond to the ἡμιπέλεκκα of Homer.

Leopold does not consider the possible objections that the axes examined by him are single-bitted ones, whereas the πελέκεις are double axes. Nevertheless, since the idea of breaking an ax into two halves is

offered previously; cf. Helbig, *op. cit.,* 349; Adolphe J. Reinach, "Securis," *DS,* IV, 1171. A special paper has been dedicatd to the interpretation fo this passage by Christian Blinkenberg, *Archaeologische Studien* (Kopenhagen, 1904), 30-47.

1. John D. S. Pendlebury, *The Archaeology of Crete; An Introduction* (London, 1939), 319.

2. *Op. cit.,* 311.

3. "Il Ripostiglio di Piediluco," *Bullettino di Paletnologia Italiana,* III (1939), 150.

more likely to occur in relation to double axes, it is legitimate to make the supposition that the custom of splitting the axes began with the double axes and was extended from them to the single-bitted ones.

Leopold's theory is borne out by a reading of the Homeric poems. Whenever mentioned, the *ἡμιπέλεκκα* are clearly contrasted with *πελέκεις πάντες*, that is whole axes.[1] The iron of the archery contest of the Odyssey, which are likely to have been used as currency, are repeatedly said to be *πάντες*.[2] The adjective *πᾶς* is never applied to a *πέλεκυς* used as a tool Furthermore *ἡμιπέλεκκα* are never described as tools.

1. *Il.* XXIII 856, 882.

2. XIX 537, 578; XXI 76. 260, 421

3. Weighed Double Axes

It is interesting to notice that the iron utensil-money of double axes went through the same stages of development as that of *ὀβελίσκοι*. The fact that in some parts of Greece in classical times the names of *πέλεκυς* and of *ἡμιπέλεκκα* were applied to units of weight indicates that at a certain point the currency of double axes began to be measured by weight, instead of being simply defined by shape. When it was decided to measure this currency according to weight, the axes were found to be of varying weights, so that it followed that in different parts of Greece different weights were chosen as the right ones:

Scholium ad Il. XXIII 851

πελέκας ἀξίνας διστόμους. ἔστι δὲ σταθμὸς σιδήρου
ἔχων μνᾶς δέκα. τὸ δὲ ἡμιπέλεκκον τὸ ἥμισυ τοῦ πελέκεως

Hesychios s.v. *ἡμιπέλεκκον*

ἡμιπέλεκκον. τὸ τριμναῖον ἢ γεταμναῖον ἢ πεντάμνουν.
τὸ γὰρ δεκάμνουν πέλεκυς καλεῖται παρὰ Παφίοις

idem s.v. *πέλεκυς*

πέλεκυς. σταθμίον ἑξαμναῖον ἀχαῖον.οἱ δὲ δωδεκαμναῖον.

Eustathios ad Il. XXIII 575

ἰστέον ὅτι πελεκέων μὲν οὐ μία σημασία. δηλοῖ
γὰρ ἡ λέξις ὁμονυμίας λόγῳ κατὰ τους παλαιοὺς
καὶ σταθμίον ἐν Κρήτῃ ἑξάμνουν ἢ δεκάμνουν

The weight of the ἡμιπέλεκκον was fixed at three, four, five, and six minae, and that of the πέλεκυς respectively at six, eight, ten and twelve minae, according to the locality.[1]

The currency of iron axes lasted longer in Tenedos than in other parts of Greece, as appears from the circumstance that a dedication of πελέκεις from Tenedos was preserved at Delphoi[2] and that the double ax is the device of Tenedian coins.[3] The expression Τενέδιος πέλεκυς was proverbial and meant abrupt and harsh (ἀπότομος καὶ σκληρός) justice.[4] The ancients constructed various aetiological tales[5] to explain the origin of this idiom, but the real explanation is possibly the fact that to decapitate with a Tenedian ax, a cast iron ax with a dull edge, constitutes a particularly rough form of justice:

Cicero *Ad Quintum* fr. II 12,2

Tenediorum igitur libertas securi Tenedia praecisa est.

1. On the basis of the available evidence, one would conclude that the currency of double axes was used in the area extending from Tenedos in the north to Crete in the southwest and Cyprus in the southeast, and including the region in which the Homeric poems were written. The problem is worth considering because it involves the existence of such a cultural province in the Greek Dark Ages.

2. Pausanias X, XIV 1. Babelon, *op. cit.,* 76, maintains that this dedication, too, had "demonetization" as its purpose.

3. Head, *op. cit.,* 557.

4. Suidas, s.v. Τενέδιος ξυνήγορος, Steph Byz. s.v. Τένεδος.

5. Ernst Meyer, "Tenedos," *RE,* A IX, 495; cf. Nillson, *op. cit.,* 193, and literature quoted there.

4. Currency of Cauldrons

Utensil money of bronze was known to Homer in the form of λέβητες and τρίποδα. Teh two words designate the same object, viz. a cauldron of roughly hemispherical shape; the difference between the two is that the λέβης is suspended from the top, whereas the τρίπους rests on three feet. Homer repeatedly mentions the two in conjunction, and his wording indicates that they were equivalent in value.[1] Later writers describe the τρίπους as a variety of λέβης.[2] Although in Homer bronze cauldrons are often mentioned as units of value, they had not yet been reduced to a standard type: some are described as big, [3]some as having a content equal to a varying number of liquid measures,[4] some as being equal in value to a varying number of oxen,[5] and finally one is described as embossed with flowers.[6]

Cauldrons must have become standardized at a later date, because they are mentioned as precise units of value in Cretan inscriptions. The

1. *Il.* XXIII 259, 485; *Od.,* XV 84.

2.Suidas s.v. λέβης; Eustathios, *Ad Od.* XXIII 486; Cf. A. de Ridder, "Lebes," *D.S,* III, 1001

3. *Il.* XXIII 702; *Od.,* XIII 13.

4. *Il.* XXIII 268, 485.

5. *Il.* XXIII 703, 585.

6. *Od.,* III 440.

external wall of the temple of Pythian Apollo at Gortyna was covered with inscriptions concerning public law and religious consecrations. The evolution of the alphabet used reveals that the inscriptions were cut at different times; since the oldest are written sinistrorsum and the latest boustrophedon, they may have been written in a period extending roughly from the middle of the seventh century to the middle of the sixth century B.C.[1] In these inscriptions, fines are meted out in λέβητες in amounts varying from one to one hundred; but in one inscription, the fine is τρίποδα ἑνα.[2] The inscriptions are too fragmentary to allow one to draw any conclusion as to the value of these units. Domenico Comapretti,[3] the editor of these inscriptions, assumes that the τρίπους is worth more than a λέβης, but Homer, who is the only source of information available, speaks to the contrary.

The λέβης appears again as a unit of value in an inscription of

1. According to Rhys Carpenter, "The Antiquity of the Greek Alphabet," *AJA,* XXVII (1933), 26, these inscriptions, even though they "imply a state of society before the introduction of coinage, need not antedate the fifth century, as Crete was numismatically singularly backward." From oral information, I understand that Carpenter's dating is based on a study of the moldings of teh temple. Waiting for an opportunity to examine Carpenter's argument in detail, I must point out that there is no evidence to the effect that Crete was numismatically more retarded than the average of Greece; coins were struck in Crete in the sixth century (E. S. G. Robinson, "Pseudoeginetica," *NC,* VIII (1928), 194; Seltman, *Greek Coins,* 169. The architecture of the temple hardly suggests that it was built in the fifth century; Donald Struan Roberston, *A Handbook of Greek and Roman Architecture,* vol. II (Cambridge, 1943), 57, 323, ascribes it to the seventh century. Svoronos, *op. cit.,* 231, dates these inscriptions to the fifth our fourth century, but his argument is based on the identification of the λέβητες with some coins of that period, which bear a device in which he recognizes a cauldron.

2. *GDI* 4968, 127

3. "Le Leggi di Gortyna e le altre iscrizioni arcaiche oretesi," *Monumenti Antichi,* III (1894), 357.

Knossos, which cannot be dated earlier than the fourth century B.C., since it is written an Ionian alphabet. It is obvious that by this time the name was applied to a unit of silver corresponding to the value of the old bronze cauldron. In this inscription the main monetary unit is the stater, as it is in the Great Inscription of Gortyna; together with the staer are mentioned the τριώδελον and once πέντε λέβητας.[1] Since there is no mention of drachmae, whereas in the Great Inscription drachmae are mentioned with staters, triobols, and obols, it is possible that the λέβης was the equivalent of a drachma.

Bronze cauldrons were used as currency also in Delphoi in pre-classical times. Theopompos[2] reports that before the sanctuary began to receive gold and silver contribution in the time of Gyges, the dedications consisted of λέβησι καὶ τρίποσι χαλκοῦ πεποιημένοις. In a comedy by Epicharmos,[3] pilgrims to the temple enumerate among the votive offernings they see collected in the temple as τρίποδες ... λέβητες, χάλκιοί, κρατῆρες, ὀδελοί. Even in classical times there remained the habit of dedicating cauldrons to Delphoi; by then they were of a type different from that in common use as utensils and were known as ἀναθηματικοί or Δελφικοί.[4] According to Pausanias,[5] τρίποδες χαλκοῖ were kept in shrines in the Athenian street called Τρίποδες and ἀρχαῖοι τρίποδες similar to those mentioned by Homer were kept in a temple of Messene.[6]

1. *GDI* 5072.
2. Fr. 193 Jacoby.
3. Fr. 79 Kaibel.
4. Apollonios Sophista, *Lexicon Homericum,* s.v. τρίποδας
5. I. XX 1.
6. IV XXXII 1.

Addendum II:

Iron Currency of the Celts

Iron currency of the Celts

Scholars of Celtic archaeology associate the ὀβελίσκοι with the iron "currency bars" of the Britons, but fail to state what they think these two groups of objects have or do not have in common.[1] It is, therefore, proper to deal here with the nature of the "currency bars," not only to elucidate their relation to the Greek iron money, but also because I hope some of the conclusions reached in reference to the ὀβελίσκοι may help to dispel the uncertainty that exists on the subject of their Celtic counterpart.

The "currency bars" are mentioned in a corrupt text of Caesar, the best reading of which seems to be:[2]

De bello Gallico, V 12

Utuntur ut aere aut nummo aureo aut taleis ferreis ad certum pondum examinatis.

The *taleaea ferreae* have been identified withiron objects found in Britain in settlements dated around the time of Caesar (British Early

1. According to *British Museum: Guide to Antiquities of the Early Iron Age,* vol. II (London, 1925), 165 the "currency bars" are a British type of roasting spits.

2. Gerhard Wiman, "Till Caesar B. G V 12," *Eranos,* XXVII (1929), 151; Ernst Kalinka, *Bursian,* CCLXIV (1939), 176.

Iron Age B).[1] These objects have the shape of a long spatula with a handle; their weight various from 77 to 1238 grams, but the pattern is always the same. It is universally agreed that the various sizes are multiples and submultiples of a basic unit. Since they exist in graduated sizes and are unfit to be used as tools, it is considered certain that they were used as a medium of exchange. Scholars have called them "currency bars," but they have unmistakably the shame of a La Tène iron sword. This feature has been pointed out by E. Windham Hulme,[2] but his remark has not met with favor, because he associated it with the unacceptable theory that the objects in question were not currency, but swords in the process of manufacture.[3]

In my opinion, the concept of utensil-money explains how the same objects can be swords and currency at the same time. The taleae ferreae are swords, of the pattern typical of the Celtic iron culture, which, because of their use as currency, have been manufactured in a rough and rugged form.

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1. Reginald A. Smith, "Ancient British Currency," *Society of Antiquaries of London, Proceedings,* XX (1905), 184, XXII (1908), 338, who in the first of these papers deals at length with the alleged relation between and "currency bars"; idem, "The Hunsbury Hill Finds," *Archaeological Journal,* LXIX (1912), 421; idem, "Currency Bars and Water-clocks; A Reply," *Antiquity,* VII (1933), 210; Déchelette, *Manuel,* II, 1558; Sorlin Dorigny, "Talea," *DSV,* 26; Arthur Bulleid, H. St. Geroge Gray, *Glastonbury Lake Village* (London, 1917)., II, 397; Walther Bremer, "Eisenbarrenfunde," *RV,* III, 69; Thomas Kendrick, C. F. C. Hawkes, *Archaeology in England and Wales, 1914-1931* (London, 1932), 176, 182; V. Gordon Childe, *Prehistoric Communities of the British Isles* (London, 1940), 240; Cyril Fox, "The Distribution of Currency Bars," *Antiquity,* XIV (1940), 427; idem, "The Most Brilliant Phase of Prehistoric Celtic Civilisation in Britain," *Illustrated London News,* Nov. 25, 1944, 611.

2. "Currency Bars and Water Clocks," *Antiquity,* VII (1933), 61; cf. A. M. Hocart, "Curency Bars Again" *ibid.,* VII (1934), 336.

3. According to Grahame Clark, *Prehistoric England* (London, 1940), 45, they are sword "moods," but this does not preclude their use as currency.

The samples unearthed in Britain belong to an age in which utensil-money was used together with gold coins, as Caesar relates; therefore, they represent a stage of development which corresponds to that of the Greek iron money after the introduction of silver currency. Hence, one may surmise that the use of gold coins brought to the Britons the concept of weighed currency and caused iron swords to be measured by weight, instead of being simply defined by shape. The "currency bars" correspond to the weighed ὀβελίσκοι of the Spartans, which were measured by weight but still retained in some way the original shape. The iron money of the Britons was, however, a feature which is not present in its Greek counterpart; once the swords began to be measured by weight, they were manufactured in units which were multiples and submultiples of the original one.

It is assume that the basic unit is teh "currency bar" weighing around 310 grams; this conclusion has been reached because this weight happens to be one-fourth of that of the heaviest specimens and four times that of the lightest ones. I am inclined to think that the basic unit is represented, instead, by the seven "currency bars" which came to light at Worthy Down, Winchester.[1] These specimens vary noticeably in wight one from another (from 553 to 723 grams), but are all of the same appearance and almost of the same length (from 83 to 88 cm.). This length corresponds exactly to average length of La Tène swords found in Britain. According to the incomplete data of the excavation, the pottery found with the iron objects at Worthy Down seems to date them in an early period of the Early Iron Age. On the basis of these elements, I conclude that the words of Worthy Down are examples of the original unit which was used when, before the introduction of gold coins, the utensil-money of swords was defined by shape, not measured by weight.

1. Reginald W. Hooley, "Note on a Hoard of Iron Currency-Bars found at Worthy Down, Winchester," *Antiquaries Journal,* I (1920), 321.

Objects similar to the British "currency bars" have been found in a Celtic iron hoard at Tiefenau, Switzerland,[1] in the location of an Helvetian *oppidum* mentioned by Caesar.[2] In this hoard there were also Massiliote silver and bronze coins and various Gallic issues. The accepted interpretation is that the objects of Teifenau are unfinished swords; but it seems to me that they are such a vague approximation to the pattern of a sword that their shape could not be of any help in the manufacture of finished weapons. Furthermore, although some of them still retain the shape of a La Tène sword, their length (from 6 to 38 cm.) excludes the possibility of their being blanks for the manufacture of swords. The objects of Tiefenau are currency, like the "currency bars" of the Britons, and represent the very latest phase in the development of the iron currency of the Celts, in which their use had become limited to that of divisional currency.

1. Otto Tschumi, "Der Massenfund von der Tiefenau auf der Engehalbinsel bei Bern 1849-1851," *Jahresbericht der Schwizerischen Gesellschaft für Urgeschichte,* XXI (1929), 134, plate II 15-21.

2. Idem, *Urgeschichte der Schweiz* (Frauenfeld, 1926), 149.

Part Two

Athenian Standards

1. The meaning of νόμισμα

In the history of Greek coinage, there are a number of problems which have been considered mystifying ones, simply because the precise meaning of the technical terms used by ancient sources has not been investigated. In particular, very little attention has been paid to the most important word in the field of numismatics, viz. *νόμισμα*.

François Lenormant[1] has pointed out that *νόμισμα* is first used by tragic writers and that earlier the word *νόμος* was used, and Ernest Babelon[2] has noticed that *νόμος* is found where we would expect *νόμισμα*; but neither scholar has drawn a conclusion from these facts.

The word *νόμισμα* appears for the first time in Aischylos, where it is a doublet of *νόμος* and has nothing to do with currency or coins:

Septem contra Thebas 269
Ἑλληνικὸν νόμισμα θυστάδος βοῆς
"The Hellenic custom of sacrificial shout"

Persae 859
νόμισμα τα πύργινα
"social institutions like towers in strength"

The formation of nouns in *-μα* has been studied by Chantraine,[3] who

1. *La Monnaie dans l'antiquité* (Paris, 1878), I. 78.
2. *Traité des monnaies grecques et romains* (Paris, 1901), I, I, 393.
3. *Op. cit.,* 181, 189.

has concluded that they are characteristic of the Ionian dialect and, in lesser measure, of the Attic one, that they are common in Herodotos and rare in Thukydides, and that they enjoy particular favor with tragic writers. These remarks fit the case of *νόμισμα,* since the word is first found in tragedies, is used three times in Herodotos[1] and never in Thukydides, and is said not to have been used by the Dorians.[2]

Chantraine[3] observes also that when a noun in is derived from and athematic or thematic noun of older stratum, it is an emphatic synonym with a shade of difference in meaning, but its formation is due mainly to the desire to expand the root. He quotes as an example πόλισμα which is a doublet of πόλις, but conveys the idea of something more concrete. In the same way *νόμισμα* is a doublet of *νόμος*, but it suggests the idea of a *νόμος* that has found its expression in something material, as for instance coins.

This more specific meaning of *νόμισμα* developed during the fifth century B.C. The word is used for the first time in relation to currency in Sophocles, but in a context which stressed that this *νόμισμα* is but one of the many *νόμισματα* of society:

Antigone 295
οὐδὲν γὰρ ἀνθρώποισι οἷον ἄργυρος
κακὸν νόμισμα ἔβλαστε

In Euripides *νόμισμα* is usually used in relation to currency, but in one passage the word has nothing to do with money:

Iphigenia in T. 1471
καὶ νόμισμ' ἔσται τόδε,
νικᾶν ἰσήρεις ὅστις ἂν ψήφου λάβῃ

"and this shall be the rule:
the equal tale of votes acquits the accused."

1. I 94; III 56; IV 66.
2. Suidas s.v. *νόμος.*
3. *Op. cit.,* 189.

Another passage of Euripides stresses the point that the of currency is only one of the standards men should make use of:

fr. 544 Nauck, vol. II

οὗτοι νόμισμα λεκὸς ἄργυρος μόνον
καὶ χρυσός ἐστιν. αλλὰ κἀετὴ βροτοῖς
νόμισμα κεῖται πᾶσιν, ἣν κτᾶσθαι χρεών

From this text it appears that, by the time of Euripides, people had to be reminded that the word *νόμισμα* does not apply only to currency. By the end of the fifth century there must have been a conflict between a learned usage, in which *νόμισμα* was a doublet of *νόμος*, and a popular one, in which the word was felt as referring only to currency. In Aristophanes' *Nubes* 248, Sokrates says *πρῶτοι θεοὶ ἡμὶν νόμισμ' οὐκ ἔστι*, to mean that his standards of behavior are not dependent on the belief in gods; but Strepsiades understands that he is speaking of money.

A passage of Herodotos makes clear that *νόμισμα* is one of the *νόμοι* of a community, but also that *νόμισμα* is the particular *νόμος* which applies to currency:

I 94

Λυδοὶ δὲ νόμοισι μὲν παραπλησίοισι χρέωνται καὶ Ἕλληνές, χωρὶς ἢ ὅτι τὰ θήλεα τέκνα καταπορνεύουσι, πρῶτοι δὲ ἀνθρώπων τῶν ἡμεῖς ἴδμεν νόμισμα χρυσοῦ καὶ ἀργύρου κοψάμενοι ἐχρήσαντο.

The same point is borne out by Demosthenes:

Contra Timocratem 213

ἀργύριον μὲν νόμισμ' εἶναι τῶν ἰδίων συναλλαγμάτων εἵνεκα τοῖς ἰδιώταις εὑρημένον, τοὺς δὲ νόμους ἡγοῖτο νόμισμα τῆς πόλεως εἶναι.

It would seem, therefore that to clarify the concept of *νόμισμα*, one should refer to that of *νόμος*. It happens, however, that although the concept of *νόμος* is key to an understanding of Greek thought, not only in the field of jurisprudence, but also in that of politics and philosophy, it has not been the object of a thorough investigation. Enlightening

remarks have been made on this subject by Egon Weiss[1] and Ugo Enrico Paoli,[2] but both these scholars failed to go to the bottom of the problem, because they approached νόμος as the counterpart of Roman *lex.* From the passages quoted above and from the interpretation given to them, it appears that this approach is not the correct one. The Greek counterpart of lex is ψήφισμα and the Greeks drew a sharp distinction between νόμος and ψήφισμα.[3] Cicero, who was a lawyer and who was very careful in the proper Latin rendering of Greek terms, translated νόμοι by *instituta*,[4] and the phrase νόμοι καὶ ψηφίσματα by *instituta et leges*;[5] also the phrases *mores ac instituta* or *mos et consuetudo* used by Cicero[6] are renderings of the Greek νόμος. This proves that νόμος does not correspond to the concept of law which the Western world inherited from Rome.

The basic element of νόμος is consent within a given community. Νόμος is not the expression of the will of any authority, be that an autocrat or a demos; but it is a social creation: what is practiced in a given social group because it is considered right. Strangely enough, the concept of νόμος has not been penetrated by lawyers, philosophers,[7] or historians but by scholars of modern economics. This is due to the circumstance that money is a modern institution which corresponds entirely to the Greek νόμος, because it is a typical social creation: "the essential character of money is that of being accepted in payment by everybody even where there is no legal compulsion; as such money is not dependent on the

1. *Griechisches Privatrecht auf rechtsvergleichender Grundlage* (Leipzig, 1923), I 29.

2. *Studi sul processo attico* (Padova, 1933), 23.

3. Henri Francotte, "Loi et décret dans le droit public des Grecs," *Musée belge,* VIII (1904), 328.

4. *De oratore* I 58; *de institutis dicunt Graeci*; *De officiis* I 148; III 43.

5. *De legibus* I 42; *De Senectute* 34; *De re publica* VII 7.

6. *De officiis* I 120, I 148; *De re publica* II 7

7. E.g. Pierre-Maxime Schuhl, *Essai sur la formation de la pensée grecque* (Paris, 1934), 356.

existence of the state."[1] According to the economist Friedrich Wieser, [2]the minimum and sufficient requirement for the existence of money is *Massgewohnheit*. A "mass habit" is what the Greeks would call *νόμος*.

The two passages of Aristotle on have exercised an influence on the development of economic thought through the centuries. In one, he reports the opinion of his opponents, according to whom money has a value only by convention (*νόμῳ*):

> De re publica I 1257 b
>
> *ὁτὲ δὲ πάλιν λῆρος εἶναι δοκεῖ τὸ νόμισμα καὶ νόμος παντάπασι, φύσει δ' οὐθέν, ὅτι μεταθεμένων τε τῶν χρωμένων οὐθενὸς ἄξιον οὐδὲ χρήσιμον πρὸς οὐδὲν τῶν ἀναγκαίων*

In the other, he expresses his own point of view, according to which money does not exist completely (*παντάπασι*) by convention. He grants that *νόμισμα* is so called because it exists by a convention (*νόμος*) which can be changed at will; however, he limits this agreement (*κατὰ συνθήκην*) to the choice of one medium of exchange rather than another, but thinks that the medium in itself must have a value as a commodity (*χρεία*):

> Ethica Nicomachaea V 1133 a
>
> *οἷον δ' ὑπάλλαγμα τῆς χρείας τὸ νόμισμα γέγονε κατὰ συνθήκην: καὶ διὰ τοῦτο τοὔνομα ἔχει νόμισμα, ὅτι οὐ φύσει ἀλλὰ νόμῳ ἐστί, καὶ ἐφ' ἡμῖν μεταβαλεῖν καὶ ποιῆσαι ἄχρηστον.*

Up to a few years ago, these passages have been quoted in support of the theory that money is created by a *fiat* of the state.[3] But recently scholars who were interested in defining the nature of money have understood that Aristotle' thought had been completely twisted, and that the key to

1. Renzo Fubini, "Moneta," *EI,* XXIII, 632.

2. "Geld (Theorie des Geldes)," *Handwörterbuch der Statswissenschaften,* vol. IV, 681.

3. Cf. Wilfred Pareto, *Les Systèmes socialistes* (Paris, 1902), I 391; Auguste Souchon, *Les Théories économiques dans la Grèce antique* (Paris, 1898), 111; René Gonnard, *Histoire des doctrines monetaires dans ses rapports avec l'histoire des monnaies* (Paris, 1935), I 35.

the right interpretation lies in the word νόμος.[1] Eric Roll[2] writes: "In his discussion of the quality of money Aristotle concludes that money has a conventional rather than a natural origin. It was the rendering of the Greek word *nomos* into the Latin *lex* which caused considerable difficulty to later interpreters, particularly to medieval schoolmen. They were unable to distinguish between the legal-tender money and money in a more general sense, as the medium of exchange created by usage… But it is quite clear that Aristotle meant by *nomos* nothing but the convention of the market, a very different thing from the law."

The scientific concept of market referred to in the preceding quotation also helps in understanding what the Greeks meant by νόμος. It was something which as accepted as objectively right, but only within the limits of a given community; in the same way, what is the right price on a given market may no be so in another market. Each Greek city or barbarian society had its own νόμοι; the body of νόμοι of each community constitutes its . The νόμοι are the feature which distinguishes one community from another; if a city changes its νόμοι it is no longer the same community. For this reason, to cover the field of νόμοι, Aristotle wrote about the πολιτείαι of the various Greek cities and about the νόμισμα βαρβαρικὰ of barbarian societies.[3] In his πολιτείαι, he touches systematically upon the monetary standards, because they constitute one of the νόμοι of a community. The concept of money is connected with that of market; the concept of νόμος with that of community.

It was this limitation of the validity of that provided the main ammunition to the Sophists' attack on the belief in the objective justice (δίκαιον) of νόμος: they opposed what is objectively right (φύσις) to what

1. Louis Baudin, *La Monnaie et la formation des prix* (Paris, 1936), I, 214.

2. *A History of Economic Thought,* vol. II (New York, 1942), 25.

3. Cf. Cicero, De finibus, V 11; *Omnium fere civitatum non Graeciae solum, sed etiam barbariae ab Aristotele mores, instituta, disciplinas, a Theophrasto leges etiam cognovimus.*

is socially right (νόμος). But even Hippias of Elis' slogan that ὁ δὲ νόμος τύραννος ὢν τῶν ἀνθρρώων πολλὰ παρὰ τὴν φύσιν βιάζεται[1] recognizes that νόμος is not something whimsical, but has, on the contrary, a tremendous binding force.

Since the element of conventionality was easier to see in money, the more radical thinkers took advantage of the fact that money was called

to prove that all νόμοι are purely arbitrary creations. Diogenes of Sinope, who was a Cynic, that is, a man who had no respect for accepted patterns of behavior (ἀδεὴς κύων) used to state that his mission in life was παραχαράττειν τὰ νομίσματα,[2] by which he meant that it was just as easy to subvert accepted social standards as to debase or revalue currency. Somebody missed the *double entendre* of νόμισμα in this phrase and gave rise to the legend that Diogenes had forged coins.[3] It has to be noted that even according to the opinion, quoted by Aristotle, of those who thought that money had a purely arbitrary value, this value is not dependent on the arbitrament of the state or of any other authority, but on the consent of all concerned (μεταθεμένων τῶν χρωμένων).

The meaning of νόμος and of νομίσματα can be further elucidated by considering their relation to the verb νομίζω. The nouns in –σμα are derived from other nouns through a verb in –ζω.[4] Since they are *nomina actionis,* their meaning is directly dependent on that of the verb from which they derive. An analysis of the nouns in –σμα shows that they have a meaning different from that of the original noun only if the verb in –ζω introduces a new idea, or specifies the original idea. Here are some examples:

1. These words are put in Hippias' mouth by Plato, *Protagoras* 327 d; it is generally belived that Plato quotes a well-known maxim of Hippias; cf. Heinrich Gomperz, *Sophistik und Rhetorik* (Leipzig, 1912), 75.

2. Paul Natorp, "Diogenes von Sinope," *RE* IX, 770.

3. See sources quoted by Natorp, *op. cit.,* 765.

4. Chantraine, *op. cit.,* 177; Alfred William Stratton, *Chapters in the History of Greek Noun-formation,* University of Chicago Studies in Classical Philology, II, (1899), 134.

χυλός	χυλίζω	χύλισμα
juice of plants	to extract the juice of plants	extracted juice of plants
φώμος	φωμίζω	φώμισμα
morsel, bit	to feed by putting morsels into the mouth	morsel fed into the mouth
ἄκων	ἀκοντίζω	ἀκόντισμα
javelin	to throw a javelin	javelin, distance thrown with a javelin
κιθάρα	κιθαρίζω	κιθάρισμα
lyre	to play the lyre	that which is played on the lyre
πόντος	ποντίζω	πόντισμα
sea	to throw into the sea	that which is thrown into the sea
λωτός	λωτίζομαι	λώτισμα
flower	to cull the best	the flower of; the choicest

If the verb in *–ζω* develops only one of the possible meanings of the original noun, the form in *–σμα* has only one of the meanings:

οἰωνός	οἰονίζομαι	οἰώνισμα
large bird; bird of omen; *omen from the flight of birds*	to take omen from the flight of birds	omen from the flight of birds
ἀγών	ἀγωνίζομαι	φώμισμα
gathering; gathering for a contest; *contest for a prize*	to contend for a prize	contest for a prize
ψῆφος	ψηφίζω	ψήφισμα
pebble, pebble used in reckoning, *vote, decree*	to reckon with pebbles	proposal passed by a majority of votes

In the case of νόμος and νόμισμα, both nous are very close in meaning to νομίζω. The following passage from Herodotos' excursus on the νόμοι of the Persians has been quoted[1] as evidence of the intimate relation between νόμος and νομίζω.

I.131

Πέρσας δὲ οἶδα νόμοισι τοιοῖσιδε χρεωμένους, ἀγάλματα μὲν καὶ νηοὺς καὶ βωμοὺς οὐκ ἐν νόμῳ ποιευμένους ἱδρύεσθαι, ἀλλὰ καὶ τοῖσι ποιεῦσι μωρίην ἐπιφέρουσι, ὡς μὲν ἐμοὶ δοκέειν, ὅτι οὐκ ἀνθρωποφυέας ἐνόμισαν τοὺς θεοὺς κατά περ οἱ Ἕλληνες εἶναι: οἱ δὲ νομίζουσι Διὶ μὲν ἐπὶ τὰ ὑψηλότατα τῶν ὀρέων ἀναβαίνοντες θυσίας ἔρδειν

The word νομίζω has, first, the meaning of "to practice, to use customarily," and then, that of "to acknowledge, to consider." This makes it clear that the Greek νόμος corresponds to the *consuetudo* of Roman Law. For the existence of a *consuetudo*, two elements are required: *usus* and *opinio necessitudinis,* that is, a certain practice accompanied by the consciousness of abiding by a rule.[2] There is, however, a world of difference between νόμος and *consuetudo*, as far as validity is concerned; in Roman Law and in the legal systems inspired by it the *consuetudo* has a subsidiary value,[3] mainly in those matters on which the law is silent; but for the Greek a ψήφισμα is not valid if it violates a νόμος.

The distinction between *usus* and opinio *necessitudinis* helps in grasping the slight difference in meaning between νόμος and νόμισμα. By νόμος one stresses mainly the element of practice, whereas by νόμισμα one stresses mainly the element of evaluation (νομίζειν). For this reason, since in matter of currency the element of acknowledged value is more important than that of general practice, the word νόμισμα is used more specifically

1. Johann H. H. Schmidt, *Synonymik der griechischen Sprache* (Leipzig, 1876), I, 334.

2. Francesco Degni, "Consuetudine," *EI,* 219.

3. Cf. Herbert Felix Jolowicz, *Historical Introduction to the Study of Roman Law* (Cambridge, 1932), 99, who, as a good "Romanist" states that "of course" custom has little place in all legal systems of non-primitive peoples.

for the standard of currency. Notice the following use of *νομίζω* in relation to media of exchange:[1]

Plato Comicus fr. 96 Kock
ἐν Βυζαντίοις, ὅπου σιδαρέοισι νομίσμασι νομίζουσι

[Plato] Eryxias 400 b
ἐν δὲ Λακδαίμονι σιδηρῷ σταθμῷ νομίζουσι

In the matter of currency, means the value given to the unit of exchange and then, by extension, the piece to which the value is given. The two following passages in which *νόμισμα* is used in an exceptional sense may help in stressing that the "standard" is the most comprehensive translation of the word. In the first one, *νόμισμα* means the percentage of fine in the bullion:

Herodotos IV 166
Δαρεῖος μὲν γὰρ χρυσίον καθαρώτατον ἀπεψήσας ἐς τὸ δυνατώτατον νόμισμα ἐκόψατο

In the second, it means the proper content of a measure of capacity:

Aristophanes *Thesmophoriazusae* 347
κεἴ τις κάπηλος ἢ καπηλὶς τοῦ χοῦς
ἢ τῶν κοτυλῶν τὸ νόμισμα διαλυμαίνεται

The meaning of "standard" explains how the phrase *μέτρα καὶ σταθμά*, which we have already examined, was expanded into the phrase *μέτρα καὶ σταθμά καὶ νόμισμα*, meaning the monetary standard. We have already seen that the meaning of *μέτρα* overlaps that of *σταθμά*; in the same way, the meaning of *νόμισμα* overlaps that of *μέτρα καὶ σταθμά*. The relation (*μέτρα*) between drachma and mina determines the relative weight (*σταθμά*) of the silver drachma and the silver mina, and the value given (*νόμισμα*) to the unit of exchange. If we know the weight of the unit of exchange (*νόμισμα*) we know the weight of the units of weight (*σταθμά*) and the relative value (*μέτρα*) of the silver mina.

1. See also passage of Herakleides discussed on page 35.

2. The Solonian Reform

According to what I have said in the preceding section, the word *νόμισμα* has two meants, viz. that of "standard of behavior" and that of "standard of coinage"; but it must be stressed that this distinction exists only from our point of view. For the Greeks both meanings were part of the same concept, as is proved by the txt of the decree by which the Athenians re-established democratic institutions in 403 B.C.:[1]

> *ἔδοξε τῷ δήμῳ, Τεισαμενὸς εἶπε: πολιτεύεσθαι Ἀθηναίους κατὰ τὰ πάτρια, νόμοις δὲ χρῆσθαι τοῖς Σόλωνος, καὶ μέτροις καὶ σταθμοῖς, χρῆσθαι δὲ καὶ τοῖς Δράκοντος θεσμοῖς*

The text of this decree proves that the phrase *νόμοι καὶ μέτρα καὶ σταθμά* has practically the same meaning as alone. And in fact, Anokides, from whom we get the text of the decree, resumes it by the words: *χρῆσθαι τοῖς Σόλωνος νόμοις καὶ τοῖς Δράκοντος θεσμοῖς*.

The way in which Teisamenos' decree is formulated reveals also that the establishment of a new *νόμισμα* was an essential part of Solon's *νόμοι*.

The paramount sources of information on the Solonian monetary reform are a passage of Aristotle and one of Plutarch, both of which derive from the same source, Androtion:

1. Anokides, *De Mysteriis* 83.

Aristotle *Atheniensium Respublica* X

καὶ μετὰ ταῦτα τήν τε τῶν μέτρων καὶ σταθμῶν καὶ τὴν τοῦ νομίσματος αὔξησιν. ἔπ᾽ ἐκείνου γὰρ ἐγένετο καὶ τὰ μέτρα μείζω τῶν φειδωνείων, καὶ ἡ μνᾶ, πρότερον ἔχουσα σταθμὸν ἑβδομήκοντα δραχμάς, ἀνεπληρώθη ταῖς ἑκατόν, ἦν δ᾽ ὁ ἀρχαῖος χαρακτὴρ δίδραχμον. ἐποίησε δὲ καὶ σταθμὰ πρὸς τὸ νόμισμα, τρεῖς καὶ ἑξήκοντα μνᾶς τὸ τάλαντον ἀγούσας, καὶ ἐπιδιενεμήθησαν αἱ τρεῖς μναῖ τῷ στατῆρι καὶ τοῖς ἄλλοις σταθμοῖς.

Plutarch, *Solon* XV

καὶ τὴν ἅμα τούτῳ γενομένην τῶν τε μέτρων ἐπαύξησιν καὶ τοῦ νομίσματος τιμήν. ἑκατὸν γὰρ ἐποίησε δραχμῶν τὴν μνᾶν πρότερον ἑβδομήκοντα ἀγοῦσαν,[1] ὥστ᾽ ἀριθμῷ μὲν ἴσον, δυνάμει δ᾽ ἔλαττον ἀποδιδόντων, ὠφελεῖσθαι μὲν τοὺς ἐκτίνοντας μεγάλα, μηδὲν δὲ βλάπτεσθαι τοὺς κομιζομένους.

These lines have been the subject of endless disputes.[2] The disagreement

1. The manuscripts read ἑβδομήκοντα καὶ τριῶν οὖσαν but Theodore Reinach, "Zu Androtion fr. 40 Müller," *Hermes* LXIII (1928), 238 has proved that this is due to a false reading of a text which ran ΕΒΔΟΜΗΚΟΝΤΑΓΟΥΣΑΝ.

2. Aristotle agrees with Plutarch, and the weight of the drachma was diminished, according to Georg Adler, "Solon und die Bauernbefreiung in Attika," *Vierteljahrschrift für Staats- und Volkswirtschaft,* IV (1896), 119; Charles Gilliard, *Quelques reformes de Solon; Essai de critique historique* (Lausanne, 1907), 244; De Sanctis, ΑΤΘΙΣ. *Storia della Repubblica ateniese dalle origini all'età di Pericle,* second ed. (Torino, 1912), 222; Karl Julius Beloch, *Griechische Geschichte,* second ed. (Strassburg, 1913), I 2, 337; Gardner, *op. cit.,* 147; Ivan Mortimer Linforth, *Solon the Athenian* (Berkeley, 1919), 286; Seltman, *Athens,* 17; idem, *Greek Coins,* 44; Wolf Aly, "Solon," *RE,* A V 976; Segrè, *Metrologia,* 153. Aristotle agrees with Plutarch, and the weight of the drachma was increased, according to Lehmann-Haupt, "Zur Ἀθηναίων πολιτεία, *Hermes,* XXVII (1892), 531; idem, "Weiteres zu Aristoteles Ἀθηναίων πολιτεία X," *Hermes*, XXXV (1900), 637; Hill, "Solon's Reform of the Attic Standard," *NC,* XVII (1897), 284; idem, *Cambridge Ancient History,* IV, 134; Videbannt, "Metrologische Beiträge I," *Hermes* XLVII (1912), 427; idem, "Forschungen zur Metrologie des Altertums," *Abhandlungen de sächsischen Akademie, Philologisch-historische Klasse,* XXXIV (1917), 46. Plutarch is wrong and Aristotle is right, because the weight of the drachma was increased, according to Heinrich Nissen, "Die Münzreform Solons," *Rheinisches Museum* IL (1894), 7; Otto Seeck, "Quellenrschung zu des Aristoteles

begins with the issue whether Aristotle and Plutarch say the same thing; then, for the scholars who think that they do not say the same thing, there is the problem of deciding whether Aristotle or Plutarch deviated from Androtion. Finally, once it is granted that Aristotle and Plutarch give different reports, there is the problem of deciding which of the two is the correct one. On the substance of the reform, there is no agreement on the issue whether Solon increased or diminished the silver content of the drachma and whether he increased or diminished the content of measures of capacity. In my opinion, the two passages are concordant in every respect and do not present any difficulty of interpretation once the meaning of the technical terms has been defined. The main point is to be aware that the word μέτρα has nothing to do with measures of capacity, but signifies the relation between the drachma and the mina. George Grote[1] saw that μέτρα means here the number of drachmae in a mina, but his opinion was not even deemed worth a rebuttal.

Verfassungs-geschichte Athens," *Klio* IV (1904), 169; Babelon, "Les Origines de la monnaie à Athènes," *Journal International d'Archéologie Numismatique* VII (1904), 227; Kathleen Freeman, *The Work and Life of Solon: With a Translation of his Poems* (Cardiff, 1926), 90. Plutarch is right and Aristotle is wrong because the weight of the drachma was decreased, according to Bruno Keil, *Die solonische Verfassung in Aristoteles Verfassungsgeschichte Athens* (Berlin, 1892), 168; Wilamowitz, *Aristoteles und Athens* (Berlin, 1893), 42; Ulrich Kahrstedt, "Athenische Wappenmünzen und kleinasiatisches Elektrum," *Deutsches Jahrbuch für Numismatik,* 1939, 91. Plutarch is wrong and Aristotle right, because the weight of the drachma decreased, according to Frank Ezra Adcock, "The Source of the Solonian Chapters on the Athenaion Politeia," *Klio,* XII (1912), 5; idem, *Cambridge Ancient History,* IV, 39. More peculiar are the theories of Milne who maintains that Solon introduced "forced currency" in Attica to be accepted at a valuation higher than its worth of silver ("The Monetary Reform of Solon," *JHS,* L (1930), 183), and that before Solon "the drachma had been merely a term of value and bore no fixed relation to the mina" ("The Chronology of Solon's Reforms," *Classical Review,* LVII (1943), 1).

1. "Investigations on Ancient Weights, Coins and Measures," *The Classical Museum,* I (1844), 26.

In analyzing these two passages, I shall take my start from the statement which has received the least attention: Plutarch' assertion that the monetary reform was so conceived as to relieve the debtors without damaging the creditors. This assertion has been laughed at as a sheer absurdity by modern scholars, who in so doing prove that they know less about economics than Plutarch and his source. Debtors can be relieved without any harm to creditors of the inflation of currency is not followed by an inflation of prices. Whether on not such an inflation of prices takes place depends on the conditions of the market; a high viscosity of prices, such as is common in primitive economies, and an increasing volume of trade, such as might have been the case in Athens at that time, tend to keep prices at an even level in spite of the increase in units of money in circulation. Whether or not it is true that prices did not rise as a consequence of Solon's reform, Plutarch's statement reveals how the monetary reform was conceived. The unit of value was not changed, but its content of silver was decreased. The unit of value was the drachma, a unit conceived as representing a quantity of iron, but the common medium of exchange was silver. Prices were expressed in drachmae, but debts had to be paid in silver measured by minas. Plutarch and Aristotle state that the μέτρα, that is the worth in drachmae of a silver mina, was increased: the new relation of 100 drachmae to a silver mina is higher than the previous one of 70 drachmae to a mina (μείζω τῶν φεδωνείων). The unit of value was not changed, but its content of silver was reduced, so that creditors would receive the same number of drachmae (ἀριθμῷ μὲν ἴσον), but less in intrinsic value of silver (δυνάμει δ'ἔλαττον).

In substance, what Solon did was to increase the value of silver in relation to all other commodities and to iron in particular. Whether Solon's reform had as its purpose the relief of debtors or whether this purpose is a later rationalization, it is a fact that the reform conformed to the interest of the Athenians as a whole, because Attica was the most

important silver-producing center of Greece.[1] Solon was enforcing a policy similar to that supported by the "silver bloc" in the Congress of the United States, viz., the increase in the evaluation of silver in relation to gold and all other commodities.

If less silver was necessary to make the value of a drachma, the worth of silver was increase; this is what Plutarch means by τοῦ νομίσματος τιμήν, a higher assessment of the value of currency." The value of the accepted medium of exchange (νόμισμα) was increased; in other words, the value given to the silver pieces in circulation was increased. Plutarch's words τοῦ νομίσματος τιμήν have to be placed in relation to Aristotle's ἦν δ' ὁ ἀρχαῖος χαρακτὴρ δίδραχμον, which means that the prices which had been struck (χαρακτήρ) for the worth of two drachmae had their value enhanced. Scholars have taken this sentence of Aristotle as a piece of historical information added parenthetically without reference to the main matter in question;[2] on the contrary, it is an explanation of what Aristotle says in the preceding sentence. The meaning of ἀρχαῖος is not that of "ancient, primitive," as the opposite of ὕστερος, but that of "precedent to the reform" as the opposite of καινός;[3] ἀρχαῖος has the same import as πρότερον in the preceding sentence. The striking of new coins of lighter weight was an event which followed the reform, but at the moment of the reform the novelty consisted in giving a higher value to the silver already in circulation.

Aristotle's phrase τήν τε τῶν μέτρων καὶ σταθμῶν καὶ τὴν τοῦ νομίσματος αὔξησιν has caused a great deal of misgiving, but it does not meaning anything different from Plutarch' τῶν τε μέτρων ἐπαύξησιν. Aristotle uses

1. It must be noted, however, that there is no direct evidence to prove that the mines of Laurion were exploited in Solon's time; nevertheless, the large Athenian issues of silver coins suggest that they were exploited.

2. *Aristotle's Constitution of the Athens*, second revised edition, edited by John Edwin Sandys (London, 1912), 40.

3. καινόν νόμισμα was an accepted idiom; cf. Segrè, *Circolazione monetaria,* 45.

the expression *μέτρα καὶ σταθμὰ καὶ νόμισμα* because it was the idiomatic way of describing the standard of currency. Aristotle's phrase, even though idomatic, is perfectly correct in its literal meaning too: the increase of *μέτρα* brought about the increase of *σταθμά* and of *νόμισμα*. The *νόμισμα* was increased in the sense that the value given (*νομίζειν*) to the currency in circulation was increased: *τοῦ νομίσματος αὔξησιν* has the same meaning as Plutarch's *τοῦ νομίσματος τιμήν*. The *σταθμά* wre increased in the sense that the weight of the mina, and of the talent thereof, was increased in relation to the drachma taken as the term of reference. One must keep in mind that the Greeks did not define weight in an absolute manner, but only in relation to other weights, and that the only weight which was officially fixed by the state was the drachma, because it was necessary to the operation of the mint. Hence, although in an absolute sense it is a matter of reducing the weight of the silver drachma, in a relative sense the weights of the mina and of the talent were increased.

There can be no doubt that his is the correct interpretation, because Aristotle, having spoken of *τήν τε τῶν μέτρων καὶ σταθμῶν καὶ τὴν τοῦ νομίσματος αὔξησιν*, proceeds to elaborate on it by explaining a term at a time:

μέτρα	*ἔπ' ἐκείνου γὰρ ἐγένετο καὶ τὰ μέτρα μείζω τῶν φειδωνείων*
σταθμά	*καὶ ἡ μνᾶ, πρότερον ἔχουσα σταθμὸν ἑβδομήκοντα δραχμάς, ἀνεπληρώθη ταῖς ἑκατόν*
νόμισμα	*ἦν δ' ὁ ἀρχαῖος χαρακτὴρ δίδραχμον*

The increase in *μέτρα* means the change from the relation 70 (*φειδώνεια μέτρα*) to the relation 100. To equalize (*ἀναπληρόω*) the weight (*σταθμόν*) of a mina, 100 silver drachmae are needed, whereas before 70 were sufficient. The drachma is taken as the reference point, so that the weight of the mina is considered as having changed (*πρότερον ἔχουσα σταθμὸν*). The result was that the pieces in circulation (*νόμισμα*) became worth more than two drachmae. It is important to notice the parallelism between *πρότερον* and *ἀρχαῖος*, to which I have referred above.

In substance, all that Solon did was change the *μέτρα,* with the result that the value of a drachma was no longer represented by 1/70 of a silver mina according to the *φειδώνεια μέτρα,* which were a modification of the original equivalence of a silver shekel to a drachma. Solon fixed the weight of the silver drachma at half an Egyptian *kedet*, or the weight of a didrachm at a *kedet*.

The issuance of coins on the basis of a didrachm weighing a *kedet* followed the reform, but was not an essential part of it. There is no information to the effect that Solon tried to withdraw the old coins from circulation; on the contrary, by stating that he increased the value of the old coins, Aristotle seems to exclude it. There is, however, a passage which may be understood to mean that the tyrant Hippias tried to withdraw the old drachmae from circulation by ordering citizens to bring them to the mint and have them melted and issued again according to the new standard:

[Aristotle] Economics 1347 a

τό τε νόμισμα τὸ ὂν Ἀθηναίοις ἀδόκιμον ἐποίησε, τάξας δὲ τιμὴν ἐκέλευσε πρὸς αὑτὸν ἀνακομίζειν: συνελθόντων δὲ ἐπὶ τῷ κόψαι ἕτερον χαρακτῆρα, ἐξέδωκε τὸ αὐτὸ ἀργύριον.

This passage has been a boon to those scholars whose interpretation of the Solonian reform does not agree with what is known about Athenian coinage in classical times, because it has been used to prove that there was a further monetary reform in the time of Hippias. But, as Seltman[1] has pointed out, the study of coins excludes a change of monetary standard after Solon. The interpretation according to which it is only a matter of practical enforcement of Solon's reform is supported by the wording of the passage: *τάξας δὲ τιμὴν* suggests *γενομένην ... τοῦ νομίσματος τιμήν* in Plutarch and *κόψαι ἕτερον χαρακτῆρα* suggests Aristotle's *ἦν δ' ὁ ἀρχαῖος χαρακτὴρ δίδραχμον*.

1. *Athens,* 77.

To understand the last paragraph of Aristotle, one has to keep in mind the economic phenomenon of agio. From the very words of Aristotle and Plutarch it appears that the public authority was mainly concerned with defining one unit of weight, the drachma, since this was necessary to weight the medium of exchange, silver. But, once the drachma was defined by the state for this purpose, in the practice of trade it was employed with its multiples and submultiples to weigh all commodities, not only silver. Obol, drachma, stater, mina, and talent were used as general units of weight, which the result that once a relation (μέτρα) between silver and a given commodity was accepted, there followed an equivalence between a given amount of silver and a corresponding weight of a given amount of a given commodity. But, in spite of this equivalence, silver had the advantage of liquidity which was not possessed by the other commodities; in other words, silver was at agio over all other commodities. This form of agio was taken into account by making the weights used for commodities other than silver heavier than those used for silver; the result was that the party who traded silver received something extra as premium. Aristotle explains that Solon, having changed the weight used to weigh silver, changed in a similar way the weights used for the other commodities. These weights were not identical with silver weights, but were changed in proportion to the corresponding silver weights (πρὸς τό νόμισμα). This agio was fixed at 5 percent, so that the general purpose talent weighed 63 silver minae, instead of 60; all other general weights were increased over the corresponding silver weights in proportion.

It may be worthwhile noticing that when the Bank of Amsterdam introduced the custom of putting a premium (agio) on bills of exchange over gold currency, the measure was formulated in a manner similar to that mentioned by Aristotle: the ducatoon of Holland which had a current value of 63 stabers, was credited to depositors for only 60 stabers.[1]

1. Charles Conquelin, "Agio," *Cyclopaedia of Political Science,* edited by John J. Lalors (Chicago, 1886), I, 35.

Since by the study of Athenian coins it has been gathered that the drachma of the Attic mint weighed around 4.36 grams, it follows that the general weights, to which 5 percent was added for agio, were based on a mina of ca. 458 grams. In Pernice's catalogue of Attic reference weights, there are three weights which represent four times or one-eighth of this mina and which bear the inscription *μετρονόμον*:

271	ΜΕΤΡΟΝΟΜΩΝ; ΔΕΜΟ	1854⅜ grams
323	ΜΕΤΡΟ	55.37 grams
405	ΜΕΤΡΟΝΟΜΩΝ; ΔΕΜΟ	57.06 grams

These legends who that the mint officials were entrusted with the care of silver weights, whereas the weights used to weigh all other commodities were the province of the *μετρονόμοι*. This agrees with what Aristotle says about these magistrates:

Atheniensium Respublica LI

καὶ οὗτοι τῶν μέτρων καὶ τῶν σταθμῶν ἐπιμελοῦνται πάντων, ὅπως οἱ πωλοῦντες χρήσονται δικαίοις.

3. The Hybrid System of Weights

Since Solon's reform resulted in the creation of a new lighter drachma, the old drachma came to be known as παχεῖα δραχμή. The heavier pre-Solonian drachma was identical with the Aeginetan one, so that the term παχεῖα δραχμή was applied also to the Aeginetan drachma. When, by the action of Hippias or in other ways, the old Athenian drachmae became a rarity, the term happened to be applied in Athens only to the Aegineta drachma. When the memory of pre-Solonian coinage was forgotten except by a few experts in Attic antiquities, somebody concocted an aetiological tale to explain why the Aeginetan drachma should be called παχεῖα δραχμή in Athens:

Pollux IX 76

ἀλλὰ μὴν τὴν μὲν Αἰγιναίαν δραχμὴν, μείξω τῆς Ἀττικῆς, (δέκα γὰρ ὀβολοὺς Ἀττικοὺς ἴσχυεν),[1] *ἣν οἵ Ἀθηναῖοι παχεῖαν δραχμὴν ἐκάλουν, μίσει τῶν Αἰγινητῶν Αἰγιναίαν καλεῖν μὴ θέλοντες*[2]

The existence on the Athenian market of two drachmae, one heavier and one lighter, brought about the formation of a new system of weights based on the pre-Solonian or Aeginetan drachma, but having a mina

1. The words δέκα γὰρ ὀβολοὺς Ἀττικοὺς ἴσχυεν are an erroneous addition made by Pollux to his source, as pointed out by Hultsch, *MS,* I, 154.

2. Cf. T. J. Dunbabin, "Ἔχθρη παλαίη" BSA XXXVII (1936-37), 183.

calculated at 100 drachmae, according to the of Solon. The result was the creation of a new mina and of a new talent thereof, heavier than the pan-Hellenic mina and the talent thereof. This phenomenon has been completely misunderstood and has been one of the most confusing factors in the field of Greek metrology. To make things worse, it happens that this new mina and talent are referred to under various names: an Athenian inscription calls them μνᾶ ἐμπορική and τάλαντον ἐμπορικόν; some reference weights found in Attica bear the inscription μνᾶ ἀγορ[ανόμων]; literary sources mention a τάλαντον Ἀιγιναῖον, also called *talentum Atheniense magnum*. The variety of names may be an indication that this system of weights was a spontaneous creation of the Athenian market, and not the result of a public action. For lack of a better name, I shall call these weights the "hybrid system."

The first mention of the hybrid system is to be found in an Athenian inscription, dated by William Scott Ferguson[1] to 103/2 B.C.

IG II² 1013 vv 29-36

Ἀγέτω δὲ καὶ ἡ μνᾶ ἡ ἐμπορικὴ στε[φανηφόρου δραχ]μὰς ἑκατὸν τριάκοντα κ[αὶ] ὀκτὼ πρὸ[ς] τὰ στάθμια τὰ ἐν τῶι ἀργυροκοπίωι [κ]αὶ [ῥοπ]ὴν σ[τε] φανηφόρου δραχμὰς δεκαδύο, καὶ πωλε[ίτ]ωσαν πάντες τἆλλα πάντα ταύ[τηι] τῆι μνᾶι πλὴν ὅσα πρὸς ἀργύριον διαρρήδην εἴρηται πωλεῖν, ἱστάντες τὸν πῆχυν τοῦ ζυγ[οῦ ἰσόρ]ροπον ἄγοντα τὰς ἑκατὸν πεντήκοντα δραχ[μὰ]ς τοῦ σ[τεφανηφ]όρου· τὸ δὲ πεντάμνουν [τὸ ἐμπ]ορικὸν ἐχέτω [ῥο]πὴν ἐμπορικὴν μνᾶν, ὅπως ἰσορρόπου τοῦ πήχεως γινομένου ἄγηι ἐμπορ[ικὰς μ]νᾶς ἓξ· τὸ δὲ τάλαντον τὸ ἐ[μ]πορικὸν [ἐχέτ]ω ῥοπ[ὴν μ]ν[ᾶς] ἐμπορικὰς πέντε, ὅπως καὶ τοῦ[το ἰσ]ορρόπου τοῦ π[ήχ]εως γινομένου ἄγηι ἐμπο[ρικ]ὸν τά[λαντον καὶ μ]νᾶς ἐμπορικὰς πέντε· [εἶναι δὲ σύ]νφ[ω]να πάντα τοῖς ἐν τῶι ἐμπορίωι μ[έ]τρ[οις κ]αὶ στ[α]θ[μ]ο[ῖς].

These lines of the inscription have been considered a riddle,[2] but

1. *Hellenistic Athens* (London, 1911), 430.

2. August Boeckh, *Die Staatshaushaltung der Athener* (Berlin, 1886), vol. III, 325; Segrè, *Metrologia,* 128. More sure of having found the correct interpretation are

their meaning is not too difficult to grasp, if one refers not only to what I have just stated about the hybrid system, but also to what I have just stated about the influence of the economic factor of agio on units of weight. The units of the hybrid system exist in two varieties, one heavier and one lighter. The normal variety, that is, the lighter one, is used to weigh silver and those commodities which by specific decree (διαρρήδην) must be exchanged against silver at par (πρὸς ἀργύριον ... πωλεῖν),[1] that is, without agio. All other commodities have to be measured by heavier units, which are the normal ones plus a ῥοπή; the ῥοπή is added to take into account the agio of silver over all other commodities. Both the normal silver weights and the heavier general weights of the hybrid system are called ἐμπορικά in the inscription. The part of the decree we are examining concerns in the main the ῥοπή which must be added to silver weights to get general weights.

The weight of all units, whether of the normal or of the heavier variety, is not expressed in pre-Solonian or in Aeginetan drachmae, but in Solonian drachmae. The Solonian silver drachma is called δραχμὴ τοῦ στεφανηφόρου; reference weights for it are kept at the public mint (τὰ στάθμια τὰ ἐν τῶι ἀργυροκοπίωι).

The ῥοπή added to the silver weights to make them general weights is not calculated by percentage, but in an approximate way, by adding one of the weights which are readily available. A ῥοπή of twelve Solonian drachmae is added to a silver μνᾶ ἐμπορική; a silver μνᾶ ἐμπορική is added to a silver πεντάμνουν ἐμπορικόν; a silver πεντάμνουν ἐμπορικόν is added to a silver τάλαντον ἐμπορικόν. By reducing all weights to Solonian silver drachmae (δραχμὴ τοῦ στεφανηφόρου), the following table results:

Ferguson, "The Oligarchic Revolution at Athens of the Year 103/2 B.C.," *Klio,* IV (1904), 8 n. 8, and Viedebannt, "Der athenische Volksbeschluss über Mass und Gewicht," *Hermes,* L I (1916), 128, 137.

1. Cf. Theophrastos *Historia plantarum* IX 6, 14: πωλεῖσθαι ... δὶς πρὸς ἀργύριον.

	Silver weights	General weights
mina	138	150
5 minae	690	828
talent	8280	8970

If the relation 138/150 had been preserved at all stages, the general weights would have had the following values:

mina	150
5 minae	750
talent	9000

The decree orders that the competent magistrates (v. 4: οἱ ἀρχοντες; v. 7: αἱ ἀρχαὶ αἷς οἱ νόμοι προστάττουσι; v. 41: αἱ ἀρχαὶ) take care that the correct samples of μνᾶ ἐμπορική and of its multiples and submultiples (vv. 54-55) be kept in public repositories, and that the weights used by traders conform to these samples. In the inscription it is not specified as to who these magistrates were, but there prevails the opinion that they were the μετρονόμοι.[1] But Wilamowitz[2] is inclined to doubt that still existed at the time of this decree, and his doubt is sustained by teh study of the sample weights listed by Pernice. Since the μνᾶ ἐμπορική used for general purposes was equal to 150 drachmae of the mint, reference weights approaching 654 grams have to be classified as samples of this mina. Two such weights are no. 598 (646.70 grams) and no. 599 (645.08 grams), both of which bear the legend MNA AΓOP. Pernice[3] and Viedebannt[4] read μνᾶ ἀγορ[αία], but since there is no authority for this term, I would rather read μνᾶ ἀγορ[ανόμων]. The same goes for a sample of double mina, no. 604 (1360.70 grams), with the legend ἀγορ[ανόμων]

1. Victor Ehrenberg, "Metronomoi," *RE,* XXX, 1486; Viedebannt, *op. cit.,* 132; but cf. Ferguson, *Hellenistic Athens,* 430: "various magistrates."

2. *Aristoteles und Athen,* 219 n. 62.

3. *Op. cit.,* 54.

4. *Op. cit.,* 139; cf. Segrè, *op. cit.,* 129.

δίμ[νουν], and for a sample of half mina, no. 97 (335.40 grams) with the legend ΑΓΟΡ/ΑΘ/ΝΟ/ΗΜΙ which may stand for ἀγορανόμων Ἀθηναίων νόμῳ ἡμισυ. If my reading is correct, the conclusion is that the μνᾶ ἐμπορική was the province of the ἀγορανόμοι. It is possible, therefore, to surmise that by the time the μνᾶ ἐμπορική began to be used to weigh commodities different from silver, the office of the μετρονόμοι had been abolished and their function transferred to the ἀγορανόμοι. A positive answer to this problem could be given only by a study of the lettering styles of weight legends, which would make it possible to classify sample weights in chronological order. Offhand, I can only remark that the weights with the legend μετρονόμον bear the inscription δημό[σιον], spelled with an epsilon, and that such a mingling of old Attic and Ionian alphabets would date them around the time of the Peloponnesian War.

4. Old and New Drachmae

Since the hybrid system of weights was based on the pre-Solonian drachma, which is identical with the Aeginetan one, the weights of this system came to be known also as Aeginetan; nevertheless, they are a purely Athenian creation, since they are based on the Solonian μέτρα of 100 drachmae to a mina. Obviously the memory of the pre-Solonian drachma was lost by the time this system of weights developed.

> Etymologicum Magnum, s. v. Ἀιγιναῖα
>
> ἐλέγετο δὲ καὶ τὰ μεγάλα <σταθμὰ> Ἀιγιναῖα,
> ἀπὸ τοῦ νομίσματος. καὶ γὰρ τὸ Αἰγιναῖον
> τάλαντον πλεῖον ἠδύνατο τοῦ Ἀττικοῦ

There is an evident lacuna after μεγάλα, but the context makes it clear that it can be restored as <σταθμὰ>. This passage states that the weights are called Aegineta because they are based on a coinage unit of Aegina, not because they are of Aeginetan origin.

In a passage of Priscianus the same talent is called *talentum Atheniense magnum*:

> *Talentum Atheniense parvum minae sexaginta, magnum minae octagina tres et unciae quattuor.*

The unit described here as being equal to 83 3/12 pan-Hellenic silver minae is the silver talent of the hybrid system. Since 60:83 3/12 = 100:139,

it follows that Priscianus reckoned the silver mina of the hybrid system as equal to 139 Solonian silver drachmae, whereas the inscription examined above makes it equal to 138 Solonian drachmae.

Since the relation between the pre-Solonian and the Solonian silver drachma is 1/70 : 1/100, one hundred silver drachmae of the hybrid system should be equal to 142.85 Solonian silver drachmae. The circumstance that this relation was instead calculated as varying between 138 and 139 reveals how the relation between the pre-Solonian and Solonian silver drachma was figured out in the practice of Athenian trade. Three heavy drachmae were considered equal to four light drachmae plus an obol of light drachma, or a heavy drachma was considered equal to eight obols of light drachma plus a third of an obol. In other words, the heavy drachma was considered equal to the 25/18 of light drachma; this makes 100 heavy drachmae equal to 138.8 licht drachmae, whereas theoretically it should have been 142.85. This figure 138,8 explains the discrepancy between Priscianus and the inscription: the former gives the next highest round figure, 139; whereas the latter gives the next lowest round figure, 138.

3. Unification of Monetary Standards in the Athenian League

In 1880 Wilamowitz,[1] on the basis of Aristophanes' Aves 1040-41, supposed that the Athenians had passed a decree establishing unity of μέτρα καὶ σταθμά καὶ νομίσματα throughout the Athenian League; he understood that thereby there had been established *Einheit in Mass, Gewicht und Münze.* This supposition was confirmed when Adolf Wilhelm noticed that a fragment of an inscription which used to be in the Arundel collection in Smyrna and a fragment of an inscription discovered in Siphonos contained an Athenian decree on the uniti of in the Athenian League. Other fragments of the same decree were later discovered in Syme, Aphytis, and Kos. All the fragments have been fitted together and edited by Mario Segrè.[2]

The part of the decree which can be read in the fragments contains only rules of enforcement of a decision of which we do not have the text. Nevertheless, the substance of the decision can be gathered from

1. *Anzeiger der Akadmie der Wissenschaften zu Wien*, Philologisch-historische Klasse, XXXIV (1897), 180, LXI (1924), 157; *Jahresbericht des österreichischen archäologischen Instituts in Wien,* I (1898), Beiblatt, 43.

2. "La legge ateniese sull'unificazione della moneta," *Clara Rhodos,* IX (1938), 151.

the text of the oath by which the members of the Athenian Boule bind themselves to punish any violation of the order. The oath reads:[1]

> ἐάν τις κόπτηι νόμισμα ἀργυρίο ἐν τῆσι πό[λεσι] καὶ μὴ χρῆται νομ[ίσμασιν τοῖς] Ἀθη[να]ίων ἢ σταθμοῖς ἢ μέτ[ροις ἀλλὰ ξενικοῖς νομίσμασι]ν καὶ σταθμοῖς καὶ [μ]έτροις, [θανάτωι ξημιόσασθαι κατὰ τὸ ἔτε]ρον ψήφισμα ὃ Κλέαρχ[ος εἶπεν]

Segrè, following Wilhelm,[2] fills the lacuna after *σταθμοῖς καὶ [μ]έτροις* with the words *[τὴν τιμωρίαν εἶναι κατὰ τὸ πρότε]ρον,* but I suggest the restoration give above, bacause in another part the degree specifies: *ἐάν τ]ις εἴπ[ηι ἢ] ἐπιψηφίσηι περ[ὶ τούτων ... ἐς ἄλλο] τι χρῆσθαι ἢ δανε[ίζεσθαι, ἀπαγέσθω αὐτίκα μάλα πρὸς] τοὺς ἕνδεκα· οἱ δ[ὲ ἕνδεκα θαν]άτωι ζ[ημιωσάντων];* therefore it is likely that the decree mentioned the death penalty in the oath of the Boule too.

Since fragments of the inscription discovered in five different localities contain only rules for the enforcement of an order, the text of which is not given, it is possible that the basic order was not contained in this decree, but in the decree of Klearchos mentioned in the inscription. In other words, it may be that Klearchos proposed a decree establishing the unity of *μέτρα καὶ σταθμά καὶ νομίσματα*, and later a second decree, the decree of the inscription, was passed to enforce the observance of the first one.

In any case, there is no doubt that by this decree or by a preceding one, the cities of the Athenian League were required to use Athenian *νομίσματα καὶ μέτρα καὶ σταθμά*. But, while this point is perfectly clear, scholars have failed to understand the meaning of the phrase. Wilhelm[3] thought that the decree dealt with *Durchführung einheitlichen Mass- Münz- und Gewichtswesen*. Rudolf Weil,[4] who was the first to study the significance of the inscription for numismatic science, read in it a "prohibition to

1. *Op. cit.,* 175.

2. Cf. *IG* XII, V, 480.

3. *Anzeiger Akademie Wien,* XXXIV (1897), 180.

4. "Das Münzmonopol Athens im ersten attischen Seebund," *Zeitschrift für Numismatik,* XXV (1905), 54.

coin silver in the cities of the League." This interpretation has been universally accepted; but, since the evidence afforded by coins shows that some members of the League never ceased issuing silver, [1]numismatists concluded that the decree was passed but never enforced. This incongruity was explained by supposing that the decree was passed when Athens was no longer in a condition to impose her will upon her subject-allies. On the assumption that such a situation existed after the collapse of the Sicilian expedition, the decree has been dated around 412 B.C.[2] According to this interpretation, the decree should be an example of the excesses of Athenian imperialism on the eve of the final catastrophe; it would be an example of the ὕβρις described by Thukydides. On the other hand, those scholars who concentrated their attention on the epigraphical style of the inscription were inclined to exclude a date later than 420 B.C.[3]

The question of the date has been finally settled by the discovery of the fragment from Kos, a fragment which, written in Attic letters, can be compared with a series of dated Athenian inscriptions. Segrè[4]

1. Allen B. West, "Fifth and Fourth Century Gold Coins from the Thracian Coast," *Numismatic Notes and Monographs*, XL, 93; John Mavrogordato, *A Chronolgical Arrangement of the Coins of Chios, NC,* XV (1915), 374; Seltman, *Greek Coins,* 111.

2. Weil, *op. cit.,* 56; Babelon, *Traité,* II, III, 33; idem, "La politique monétaire d'Athènes," *Revue numismatique,* XVII (1913), 481; Max Romstedt, *Die wirtschaftliche Organization des athenischen Reiches,* Inaugurual Dissertation (Leipzig, 1914), 20; Eugène Cavaignac, *Ètudes sur l'histoire financière d'Athènes au Ve siècle: Le Trésor d'Athènes de 480 à 404* (Paris, 1908), 186; Gardner, *op. cit.,* 228; idem, "Coinage of the Athenian Empire," *JHS,* XXXIII (1913), 150.

3. Charles Michel, Recueil d'inscriptions grecques (Paris, 1912), Supplément I, 1439; SLG, vol. III, 87; Friedrich Hiller von Gaertringen, "Ἀττικὸς νομισματικὸς νόμος ἐκ Σύμης," Ἀρχαιολογικὴ ἐφημερίς (1923), 117; Marcus N. Tod, *A Selection of Greek Historical Inscriptions to the End of the Fifth Century B.C.* (Oxford, 1933), 187; David M. Robinson, "A New Fragment of the Athenian Decree on Coinage," *American Journal of Philology,* LVI (1935), 151.

4. *Op. cit.,* 171.

declares for a date around 450 B.C. and James Henry Oliver[1] accepts this new dating.

If the decree of the inscription was passed in the middle of the fifth century, it is no longer possible to assume that it was never enforced. Besides, at that time the relations between Athens and the members of the League were such as to exclude an action which would have been considered by the Greeks an extreme violation of the sovereignty of the allied cities. Therefore, the decree must have had a different purpose from that ascribed to it by its interpreters.

On the basis of mere numismatic evidence, Allen B. West[2] and Seltman[3] have concluded that a decree must have been passed before 432 B.C. to compel the members of the League to issue coins according to the Athenian standard. Since the phrase *νομίσματα καὶ μέτρα καὶ σταθμά* means standard of coinage,the decree of our inscription and the decree the existence of which is assumed by West and Seltman, are one and the same. The decree of the inscription, or the preceding decre of Klearchos of which this is an act of enforcement, did not forbid the coinage of silver, but order the use of Athenian, that is Solonian, standards of coinage. The decree had nothing to do with measures of capacity and left the cities free to use different weights to measure commodities other than silver. A unification of monetary standards was almost a necessity for the smooth working of the finances of the League, whereas it would be difficult to image what advantages Athens could derive by compelling others to use her weights or measures of capacity.

The oath of the Boule reads: "If someone strikes silver coins and does not use Athenian *νομίσματα* or *μέτρα* or *σταθμά* ... he shall be punished …" Those scholars who have understood this decree as aiming to establish

1. *American Journal of Philology,* LXI (1940), 381.

2. *Op. cit.,* 95.

3. *Greek Coins,* 111; Gardner, "Coinage of the Athenian Empire," 152.

a uniform system of weights and measures of capacity have been compelled to force the text to say something it does not say. Friedrich Hiller von Gaertringen and Günther Klaffenbach translate: *"Wenn einder Silbermünzen in der Städten schlägt oder nicht athenische Münzen, Gewichte und Mass braucht…"* Seltman[1] twists the text in a similar way: "If anyone in the (tributary) states strikes silver coins, or does not employ Athenian coins, weights and measures…"

In a part of the inscription which I have not quoted, the decree orders that the coins in circulation be changed δίδοντας ἑκατὸν δραχμὰς ἀπὸ τῆς μνᾶς. Such a specification would have been unnecessary if the cities had to use Athenian coins, but it is perfectly to the point if it was a matter of adopting the Athenian standard, which was characterized by μέτρα of 100 drachmae to a mina. The inscription also states that the change must be performed by the πόλις. Although up to now this word has been understood to mean the city of Athens, a check on the basis of the index of AG[2] I, reveals that, in Athenian inscriptions of this period ἡ πόλις never stands of ἡ πόλις τῶν Ἀθηναίων, but means either the Akropolis of Athens or a member of the Athenian League.

The fact the νομίσματα does not mean "coins" in our decree, is also evident from the passage of Aristophanes, on the basis of which Wilamowitz assumed the existence of the decree before the publication of the inscription:

Aves 1040

χρῆσθαι Νεφελοκοκκυγιᾶς τοῖσδε τοῖς μέτροισι καὶ
σταθμοῖσι καὶ ψηφίσμασι καθάπερ Ὀλοφύξιοι.

Some editors[2] have thought that to require a member of the League to adopt all the decrees of the metropolis is an absurdity and have

1. *Greek Coins,* 112.

2. See authors quoted by Frederick H. M. Braydes, *Aristophanis Aves* (Halle, 1882), 114, *ad h.l.*; Cf. Wilamowitz, *loc. cit.*

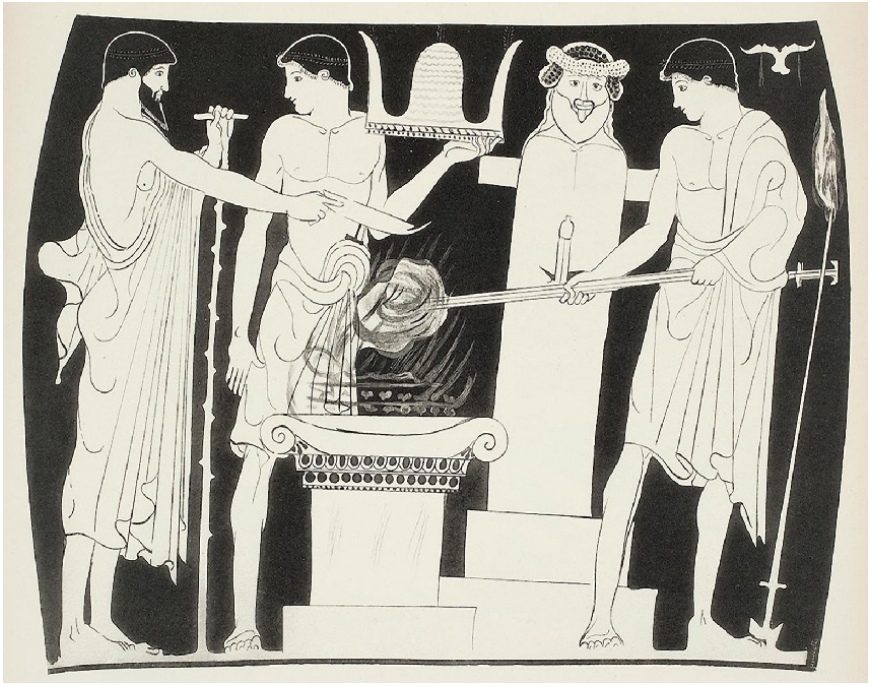
suggested that *ψηφίσμασι* be amended to *νομίσμασι*. But this emendation is not necessary, because the use of *ψηφίσμασι* for *νομίσμασι* is part of the humor of the play. In the decree with Aristophanes and his audience had in mind, *νομίσματα* meant standard of coinage, but the poet too it to mean standard in general and substituted for it *ψηφίσματα*, which had a similar meaning for those not expert in legal distinctions. The results has the absurd meaning at which Aristophanes was driving. The comical effect is achieved by punning on the double meaning of *νόμισμα*.

Plates

Plate I

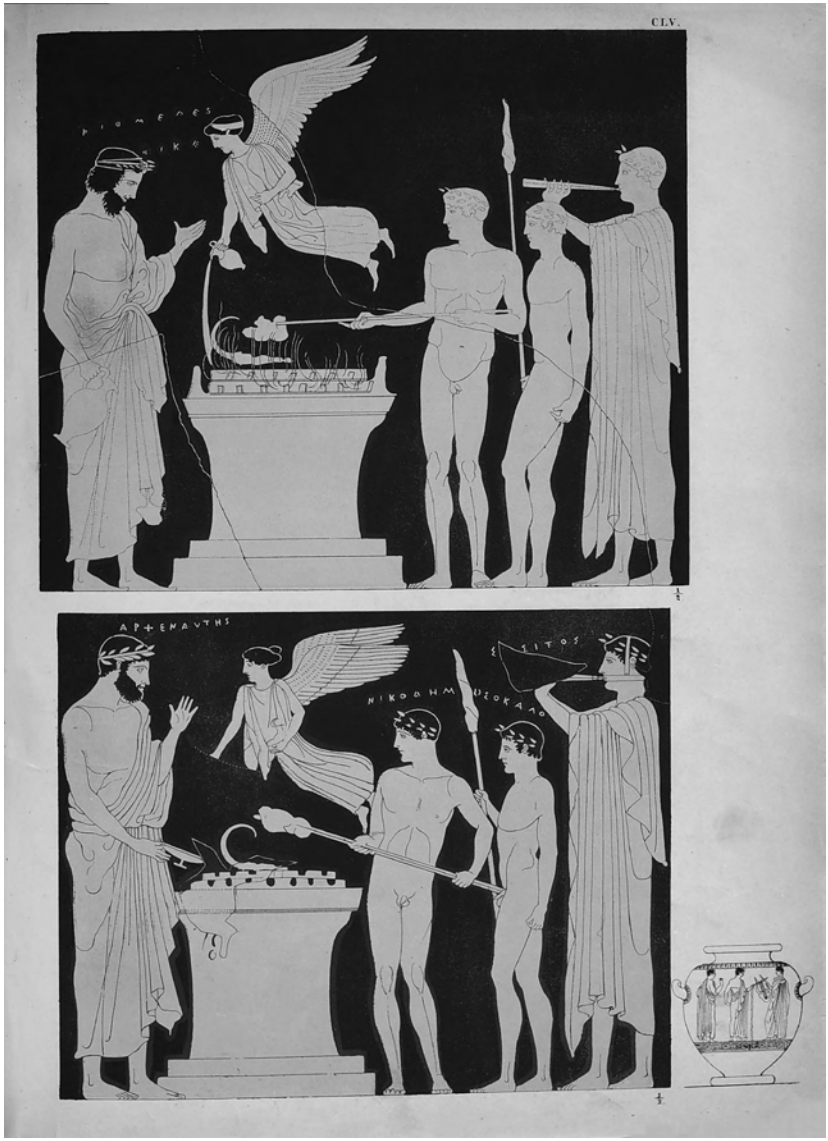
Karl Anton Neugebauer, *Antiken in deutschem Privatbesitz* (Berlin, 1938), pl. LXVIII, fig. 161

Plate II



Attic red-figured column krater, ca. 470–460 B.C.,
Pan Painter. Naples, Museo Archeologico Nazionale 127929.
After Gabrici 1913, pl. 80

Plate III

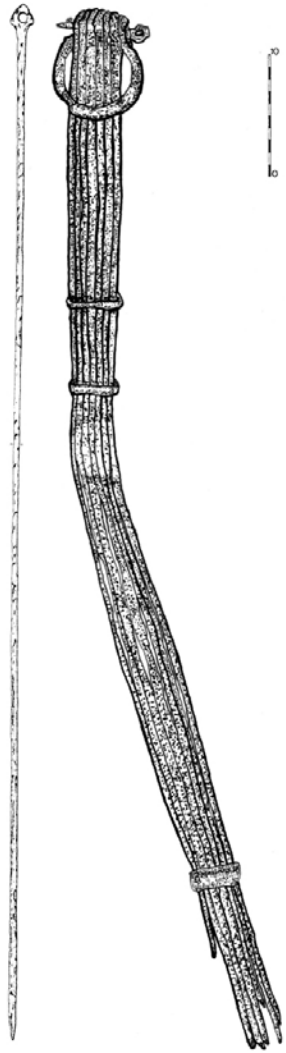


Eduard Gerhard, *Auserlesene griechische Vasenbilder Haptsächlich etruskischech Fundorts* (Berlin, 1870), vol. III, pl. CLV

Plate IV

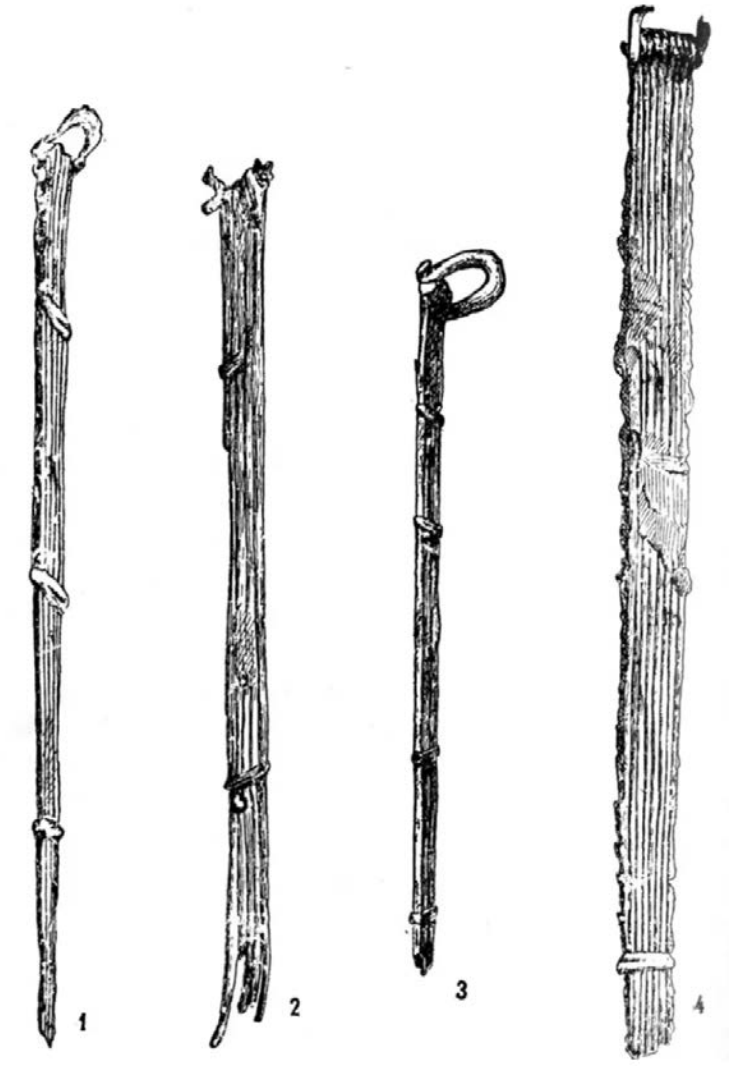
Raoul Rochette, *Peintures antiques inédites* (Paris, 1836), pl. VI;
Journal of Hellenic Studies IX (1888), pl. I
British Museum 1847.0806.54

Plate V



A bundle of seven iron spits and a single spit found in 1869 on the riverbed of the Saône near Chalon-sur-Saône. Weight: ca. 17 grams. Joseph Déchelette, *La collection Millon; antiquités préhistoriques et gallo-romaines* (Paris, 1913), p. 228; Musée des Antiquités Nationales

Plate VI



Bundles of iron spits found at Montefortino, Italy.
Joseph Déchelette, *La collection Millon; antiquités préhistoriques et gallo-romaines* (Paris, 1913), p. 226.

Plate VII

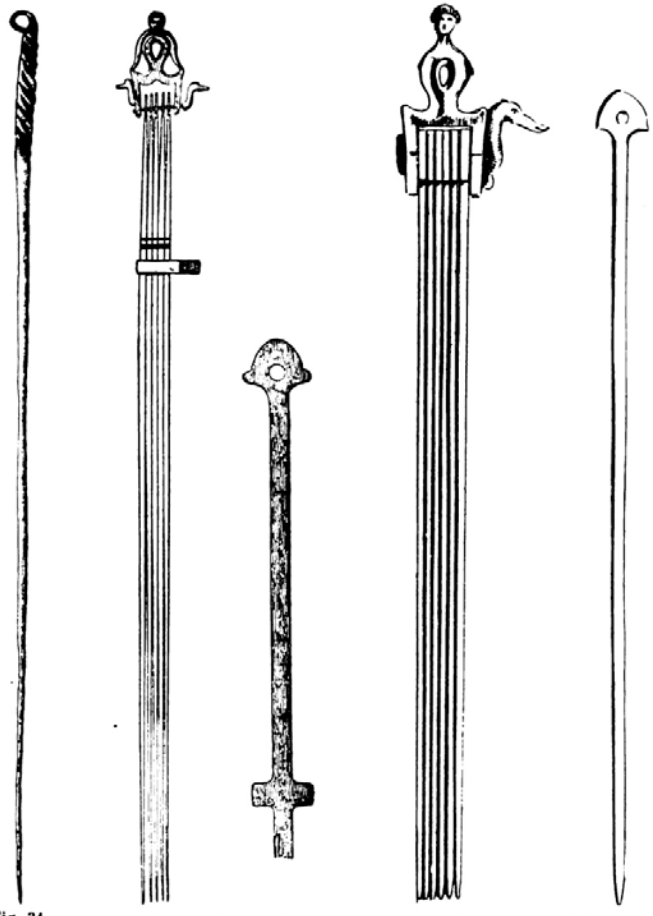


Fig. 34. Broche de bronze. Falerii (prov. de Rome); 1/4 gr. nat. (1).

Fig. 35. — Faisceau de broches en bronze. Musée de Rouen; env. 1/8 gr. nat. (2).

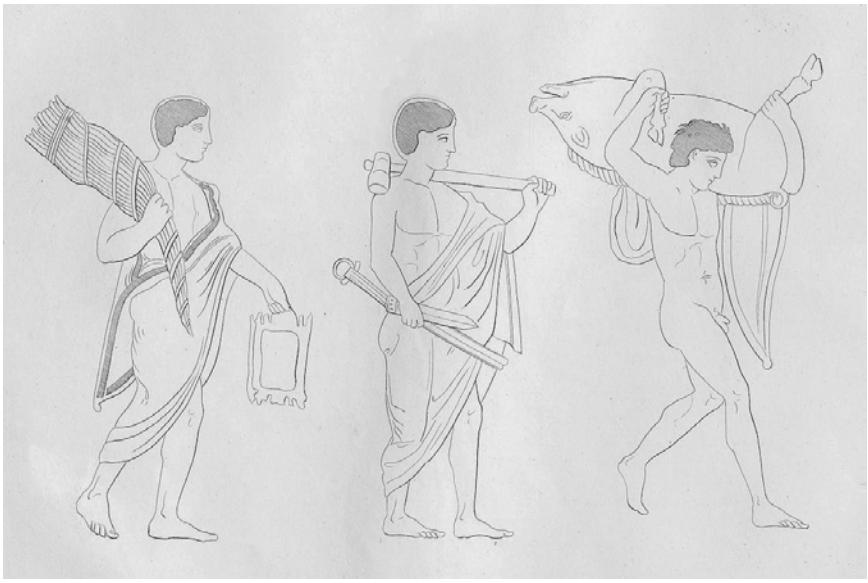
Fig. 36. — Faisceau de broches en bronze. Région d'Ancône ; env. 1/8 gr. nat. (3).

(1) D'après *Monumenti antichi*, t. IV, *Atlante*, pl. XII, fig. 24.
(2) D'après E. Cartailhac, *Ages préhist. de l'Espagne et du Portugal*, p. 268, fig. 388 et 389

Iron spits from France and Italy,

Déchelette, *Collection Millon,* p. 201

Plate VIII



Return from the Hunt, From a vase in the collection of Fileno Rainone, Sant'Agata de' Goti
Eduard Gerhard, *Antike Bildwerke* (1830), pl. LXX

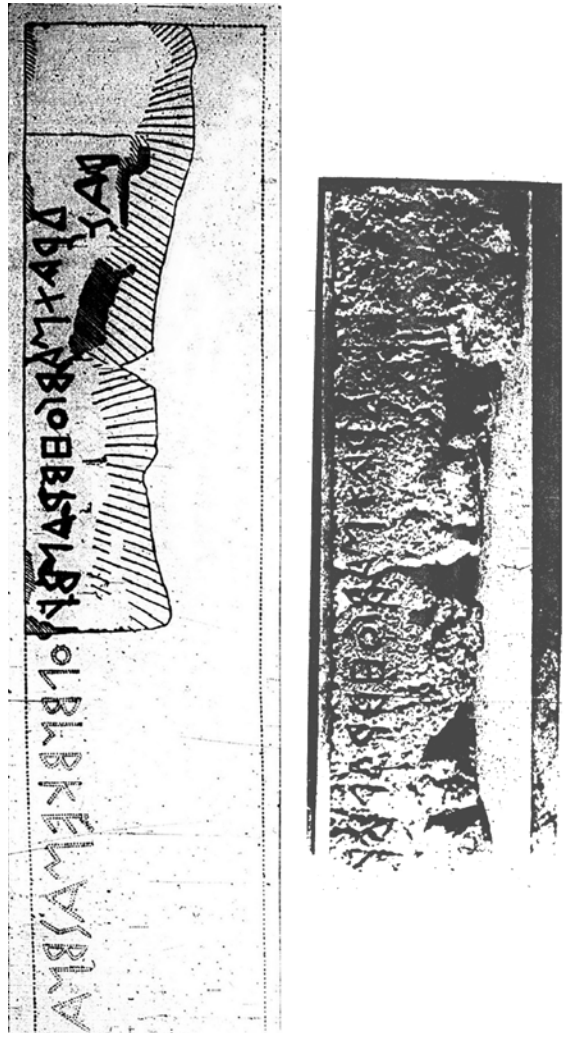
Plate IX

The Situla of Certosa (detail); molded bronze foil
Certosa Necropolis, tomb 68
Bologna, Museo Archeologico Civico, inv. 17169

Plate X

Herakles and Busiris, The Pan Painter
Attic red-figure pelike from Boeotia
Athens, National Archaeological Museum, inv. 9683

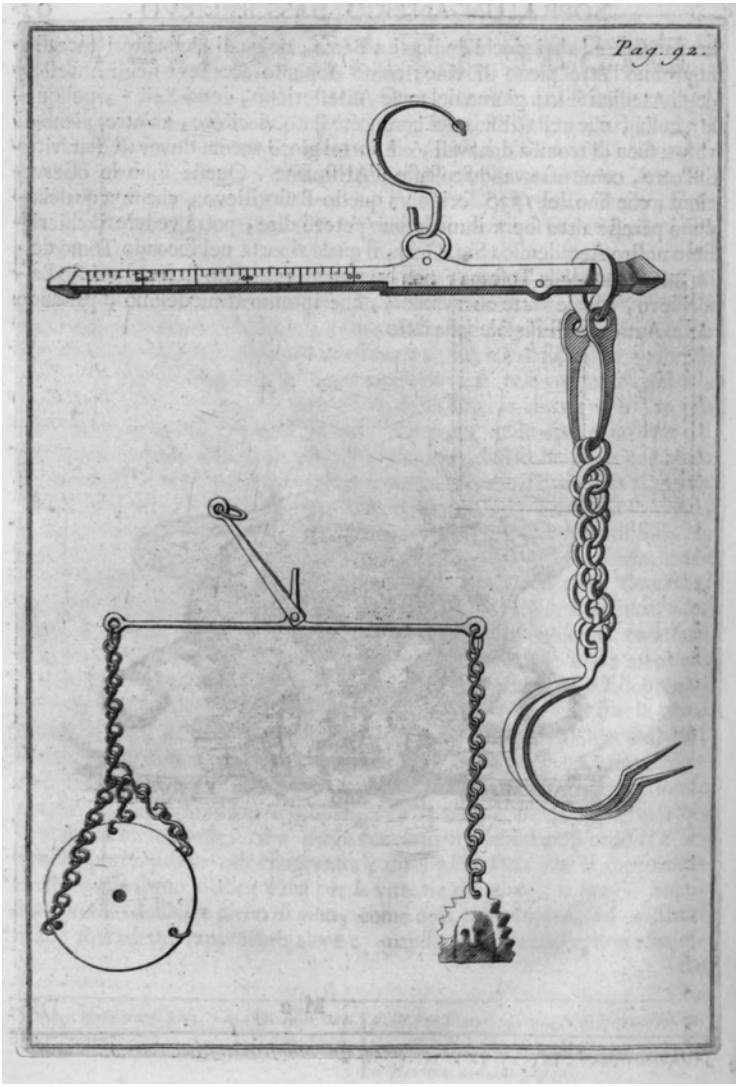
Plate XI



Left: Wade-Gery's restoration of the original stone of Perachora (Perachora, *The Sanctuaries of Hera Akraia and Limenia,* by Humfry Payne and Others, (Oxford, 1940), pl. XXXVI c)

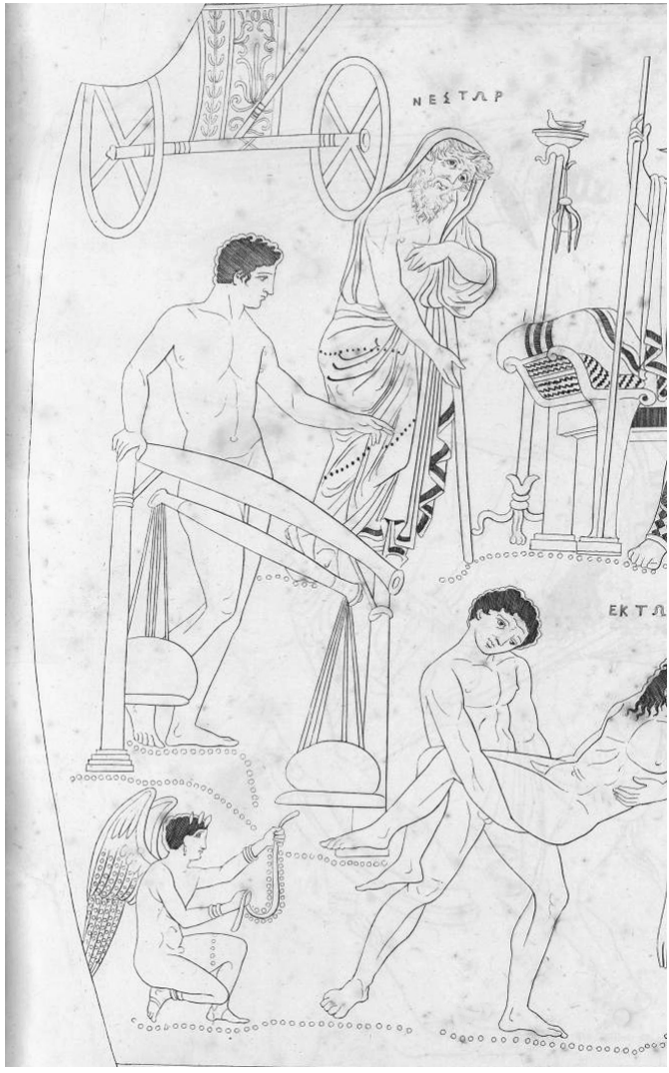
Right: Photograph of the inscription of Perachora (ibid., pl. CXXXII, 3)

Plate XII



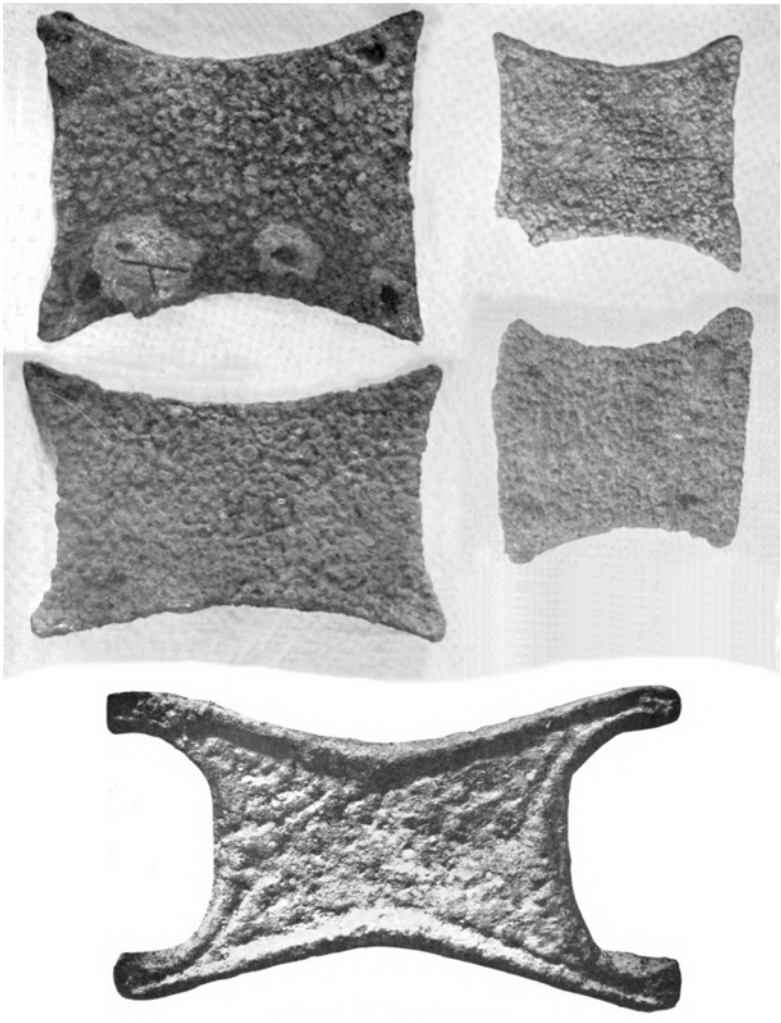
Luigi Lorenzi, "Sopra le bilancie degli antichi," *Saggi di dissertazioni, Accademia Etrusca di Cortona,* 1742, p. 92

Plate XIII



Monumenti inediti pubblicati dall' Instituto di Corrispondenza Archeologica, V (18490, pl. XI.

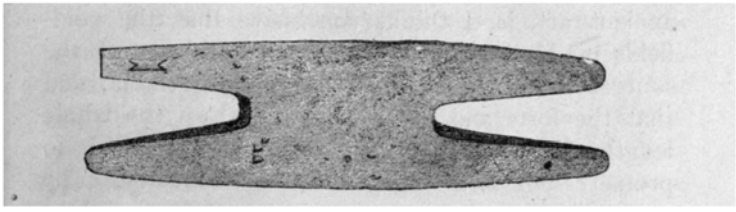
Plate XIV

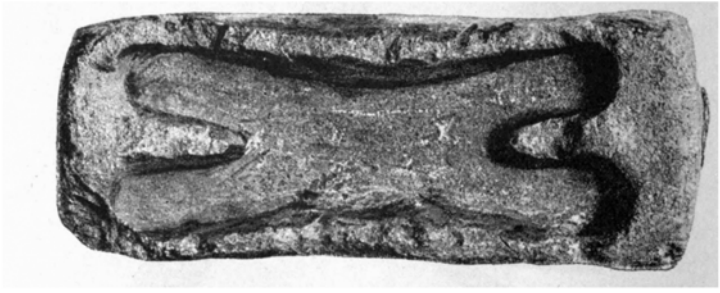


Top: Four copper ingots from Hagia Triada, rough side.
Journal of the Royal Asiatic Society, 1923, 50, 52, 53, 46.

Bottom: Copper ingot from Mycenae, smooth side.
Charles T. Seltman, *Athens: Its History and Coinage before the Persian Invasion* (Cambridge, 1924), 5.

Plate XV





1. Detail from a wall painting in the Tomb of Rekhmire.
2. Ingot of Cornish tin dredged up off Falmouth (James T. Bent, *The Ruined Cities of Mashonaland* (London, 1895), 219).
3. Tablet from Knossos }*Corolla Numismatica,* (London, 1892), 361).
4. Stone mold from the Zimbabwe gold mines (Bent, *op. cit.,* 218).

Plate XVI

Currency-bars from Worthy Down, Winchester ($\frac{1}{7}$).

"Currency Bars" from Worthy Down, Winchester (*Antiquaries Journal,* I (1921), 323)

Plate XVII

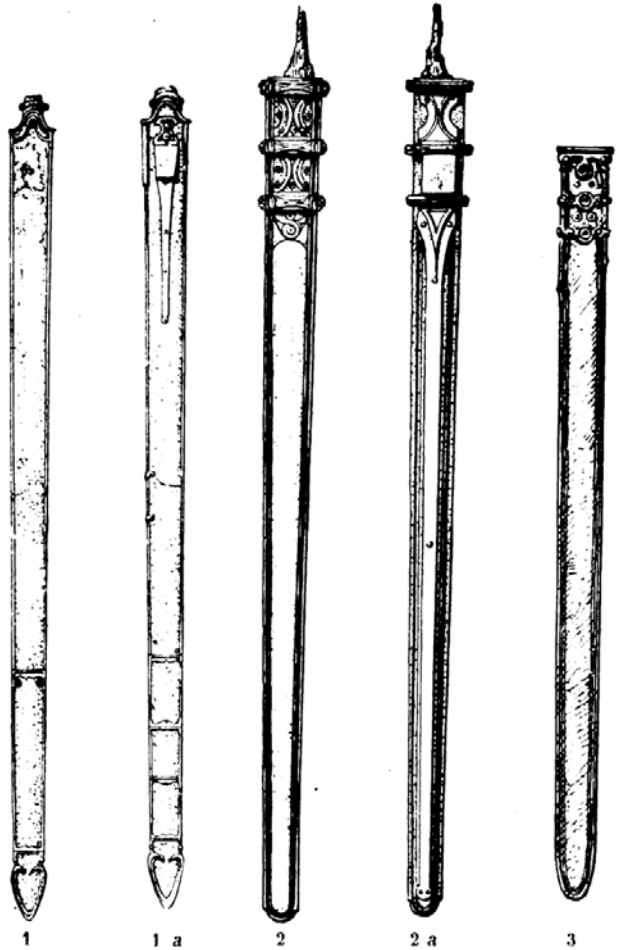
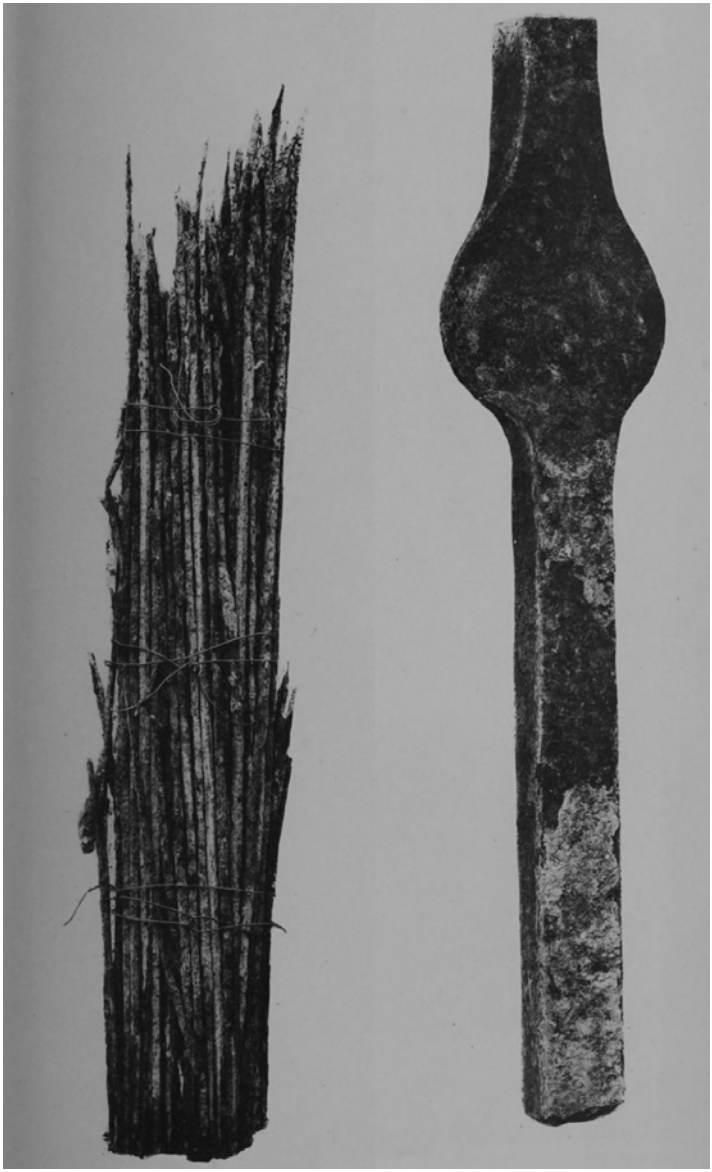


Fig. 465. — Épées des Iles Britanniques. Type de La Tène III.
1, 1 a, Lit de la Tamise, près Londres ; — 2, 2 a, Lit de la rivière Witham, près Lincoln ; — 3, Lit de la Tamise, à Battersea [1].
(env. 1/8 gr. nat.)[2].

La Tène II iron swords with scabbard, found in Britain (Déchelette, *Manuel d'archéologie préhistorique celtique et gallo-romaine* (Paris, 1914), II, 1124).

Plate XVIII



The bundle and the lingot of the Heraion (*Journal international d'archéologie numismatique,* IX (1906), pl. X

The adoption of coined money in Greece stemmed from the mutual influence of two different types of media of exchange: weighed metals and utensil-money. While the countries under the influence of Assyrian and Egyptian culture were using as currency precious metals measured by weight, the Greeks of the Dark Ages were using utensil-money counted by units in which shape and not the intrinsic content of metal was relevant. Utensil-money tended to be made of the cheapest possible metal fit for an object of the desired appearance and shape.

There are reasons to believe that the currency of double axes mentioned in the Homeric poems was of cast iron. The Spartan iron money of historical times, too, was of cast iron; this may have been a survival of an earlier general use of cast iron for the manufacture of utensil-money.

In the seventh century B.C. weighed silver began to be used in Greece as a medium of exchange. In the Peloponnese, weighed silver currency came into competition with the established currency of iron obols.

The original meaning of the word νόμισμα is not that of "coin," but that of "accepted standard" of value. The word was first used in the fifth century B.C. as a doublet of νόμος. For this reason, to clarify the concept of νόμισμα it is necessary to clarify that of νόμος. Νόμος is not to be taken as the counterpart of the Roman lex, but represents a peculiarly Greek conception of what is accepted without compulsion as the standard of right in a given community. The idea of a society based on a system of socially established standards is a key to the understanding of Greek thoughts in the field of jurisprudence, political theory, and economic doctrine.